"EFFECTIVENESS OF HEALTH EDUCATION PROGRAMME ON THE KNOWLEDGE, ATTITUDE AND PRACTICE REGARDING BIOMEDICAL WASTE MANAGEMENT AMONG DENTAL PRACTITIONERS IN MADURAI CITY"

A dissertation submitted

in partial fulfillment of the requirements

for the degree of

MASTER OF DENTAL SURGERY

BRANCH – VII

DEPARTMENT OF PUBLIC HEALTH DENTISTRY

THE TAMILNADU DR. M.G.R. MEDICAL UNIVERSITY

CHENNAI – 600 032

2016 – 2019

DECLARATION BY THE CANDIDATE

I hereby declare that this dissertation titled **"EFFECTIVENESS OF HEALTH EDUCATION PROGRAMME ON THE KNOWLEDGE, ATTITUDE AND PRACTICE REGARDING BIOMEDICAL WASTE MANAGEMENT AMONG DENTAL PRACTITIONERS IN MADURAI CITY"** is a bonafide and genuine research work carried out by me under the guidance of **Dr. SANGEETA CHAVAN, M.D.S., Reader,** Department of Public Health Dentistry, Best Dental Science College, Madurai.

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"No one who achieves success does so without acknowledging the help of others. The wise and confident acknowledge this help with gratitude."

– Alfred North Whitehead

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CERTIFICATE - II

This is to certify that this dissertation work titles "**EFFECTIVENESS OF HEALTH EDUCATION PROGRAMME ON THE KNOWLEDGE, ATTITUDE AND PRACTICE REGARDING BIOMEDICAL WASTE MANAGEMENT AMONG DENTAL PRACTITIONERS IN MADURAI CITY.**" of the candidate **S.DHEEPTHASRI** with the registration number 241623151 for the award of **MASTER OF DENTAL SURGERY** in the branch of **BRANCH VII - PUBLIC HEALTH DENTISTRY.** I personally verified the urkund.com website for the purpose of plagiarism check. I found that the uploaded thesis file contains introduction to conclusion pages and result shows **SIXTEEN** percentage of plagiarism in the dissertation.

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TITLE OF DISSERTATION	**EFFECTIVENESS OF HEALTH EDUCATION PROGRAMME ON THE KNOWLEDGE, ATTITUDE AND PRACTICE REGARDING BIOMEDICAL WASTE MANAGEMENT AMONG DENTAL PRACTITIONERS IN MADURAI CITY.**
PLACE OF STUDY	**BEST DENTAL SCIENCE COLLEGE, MADURAI – 625104.**
DURATION OF THE COURSE	**3 YEARS**
NAME OF THE GUIDE	**Dr.SANGEETA CHAVAN, M.D.S**
HEAD OF THE DEPARTMENT	**Dr.UMESH.K, M.D.S**

I hereby declare that no part of the dissertation will be utilized for gaining financial assistance/any promotion without obtaining prior permission of the Principal, Best Dental Science College, Madurai – 625104. In addition, I declare that no part of this work will be published either in print or in electronic media without the guide who has been actively involved in dissertation. The author has the right to reserve for publish of work solely with the prior permission of the Principal, Best Dental Science College, Madurai – 625104.

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Place: Madurai

(Dr.S.DHEEPTHASRI)

TRIPARTITE AGREEMENT

This agreement herein after the "Agreement" is entered into on this day Dec 2018, between the Best Dental Science College represented by its **Principal** having address at Best Dental Science College, Madurai – 625104, (hereafter referred to as, 'the College')

And

Dr. SANGEETA CHAVAN, M.D.S aged 35 years working as **Reader** in Department of Public Health Dentistry at the College, having residence address at college quarters - building, ultra nagar, Chennai high ways, Madurai – 625001 (herein after referred to as the 'principal Investigator')

And

Mr. Dr.S.DHEEPTHASRI aged 25 years currently studying as **Post Graduate student** in Department of Public Health Dentistry, Best Dental College, Madurai- 625104 (herein after referred to as the 'PG/Research student and co- investigator')

Whereas the PG/Research student as part of her curriculum undertakes to research on **"EFFECTIVENESS OF HEALTH EDUCATION PROGRAMME ON THE KNOWLEDGE, ATTITUDE AND PRACTICE REGARDING BIOMEDICAL WASTE MANAGEMENT AMONG DENTAL PRACTITIONERS IN MADURAI CITY."** for which purpose PG/Principal Investigator shall act as Principal Investigator and the college shall provide the requisite infrastructure based on availability and also provide facility to the PG/Research student as to the extent possible as a co- investigator.

Whereas the parties, by this agreement have mutually agreed to the various issues including in particular the copyright and confidentiality issues that arise in this regard.

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8. It is agreed that as regards other aspect not covered under this agreement, but which pertain to the research undertaken by the PG student, under guidance from the Principal Investigator, the decision of the college shall be binding and final.
9. If any dispute arises as to the matters related or connected to this agreement herein, it shall be referred to arbitration in accordance with the provisions of the Arbitration and Conciliation Act1996.

In witness whereof the parties herein above mentioned have on this day, month and year herein above mentioned set their hands to this agreement in the presence of the following two witnesses.

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Witnesses:

1.

2.

ABSTRACT

AIMS AND OBJECTIVES: To evaluate the effectiveness of health education programme on the knowledge, attitude and practices regarding biomedical wastes among Dental professionals in Madurai city.

MATERIALS AND METHODS: A list of 201 dental practitioners was prepared out of which 153 consented for the study. Written Informed consent were obtained from all the participants. A well-constructed self-administered questionnaire made in English. The questionnaire consisted of 27 close ended questions, consists of 8 questions to assess the knowledge,8 questions to assess the attitude and 11 questions to assess the practice regarding the biomedical waste management. The baseline data was collected after which health education provided 15 days was following which the 2nd data was collected. 15 days after 2nd data collection health education was again provided 15 days following which the final data was collected. The collected data was analysed using spss software.

RESULTS: The present study shows consistent improvement in the mean score of knowledge, attitude and practice, at the baseline (4.2, 6.03 and 2.11), at first intervention (5.03, 6.82 and 2.24) and at second intervention (6.23, 7.15 and 2.53).

CONCLUSION: It can be concluded that in the present study even though the dental practitioners have good level of awareness and knowledge regarding the biomedical waste management and also all the participants have positive attitude towards biomedical waste management but almost every participants lack in practicing the biomedical waste management in their own clinics even after providing the health education.

PUBLIC HEALTH SIGNIFICANCE: Government has taken many initiatives to treat many diseases but this can be prevented to certain extent if biomedical waste management is done

in a proper method. If the government establishes a biomedical waste management plant at every district it will surely cut down on the cost and reduce the financial burden on the dentist.

LIST OF ABBREVIATION

SL.NO	ABBREVIATIONS	MEANING
1.	HIV	Human Immunodeficiency Virus
2.	WHO	World Health Organization
3.	PVC	Polyvinyl Chloride
4.	INCLEN	International Clinical Epidemiology Network
5.	IPEN	International Program Evaluation Network
6.	BMW	Bio-medical waste
7.	BMWM	Bio-medical waste Management
8.	KAP	Knowledge, Attitude and Practices
9.	NSI	Needle Stick Injury
10.	TT vaccine	Tetanus Vaccine
11.	BDS	Bachelor of Dental Science
12.	MDS	Master of Dental Science
13.	DCI	Dental Council of India
14.	IDA	Indian Dental Association
15.	SPSS	Statistical Package for the Social Sciences

SL.NO	ABBREVIATIONS	MEANING
16.	SD	Standard Deviation
17.	No	Number
18.	GCP	Good Clinical Practice

LIST OF FIGURES

LIST OF TABLES

LIST OF GRAPHS

LIST OF CONTENTS

Introduction

Health is the ability to adapt and manage physical, mental and social challenges throughout life. As defined by the World Health Organization (WHO), health is "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity.[1] The onus of maintaining health relies on the health care system of the country. Maintaining and enhancing the health of community uses a complex amalgamation of various materials, equipment and instruments which often leads to generation of certain health care waste. The waste which is produced by the health sectors is known as biomedical waste. Biomedical waste has been defined as any waste generated during the process of diagnosis, treatment or immunisation of humans or animals, or in research activities pertaining to any of these processes, or in the production or testing of biological material. Biomedical waste has become a serious health hazard in many countries, including India. It is a potential health hazard to health care workers, the public, the flora and fauna of the area.[2] It is estimated that annually about 0.33 million tonnes of hospital waste is generated in India and, the waste generation rate ranges from 0.5 to 2.0 kg per bed per day. World Health Organisation states that 85 % of hospital waste are actually non-hazardous whereas 10% are infectious and 5% are non-infectious but they are included in hazardous waste. About 15%- 35% of the hospital waste is regulated as infectious waste.[2] Waste generated in the process of health care are composed of variety of wastes including hypodermic needles, scalpels, blades, surgical cottons, gloves, bandages, clothes, discarded medicine and body fluids, human tissues and organs, chemicals etc., Other wastes generated in healthcare settings include radioactive wastes, mercury containing instruments, PVC plastics etc.[3]

The institutions involved in generation of biomedical waste are government and private hospitals, nursing homes, dental clinics, primary health centers, laboratories, vaccinating centres Bio-technology institutions, blood banks and research organization. In the recent years

the dental hospitals, clinics and colleges have amplified exponentially which in turn has increased its contribution of the biomedical waste generation.[4] Dentistry is a multi-disciplinary system which is advancing in leaps and bounds in recent era, with innovations leading to novel technologies and materials. Dentistry uses an array of materials for delivery of dental care like acrylics, impression materials and mercury used for restorative purposes may have a possible environmental and human health impact if not handled properly.[2] The biomedical waste generated in the dental scenario includes sharps, used disposable items, infectious waste (blood soaked cotton, guaze etc.), hazardous waste (mercury, lead), and chemical waste (film developers, fixers and disinfectants).[4]These waste when inadequately treated can lead to piles of deadly infectious to health care workers, waste handlers, waste pickers and general public.

To protect the environment and community from these hazards, the ministry of environment and forest, Government of India, issued a notification on biomedical waste management rules 1998 under environment protection act. It is the duty of every occupier of a hospital or clinic generating biomedical waste to take necessary steps to ensure that such waste is handled without any adverse effect to the human health or environment.[5]

During 2002-2004, INCLEN (International Clinical Epidemiology Network) Program Evaluation Network (IPEN) conducted a comprehensive study on the assessment of injection practices in India that included mapping the status of biomedical waste management. The study concluded that there is a urgent need for greater commitments at policy and programme levels for capacity building, and resource investments in biomedical waste management.[6]

Effective management of biomedical waste is not only a legal necessity but also a social responsibility. There is a need for resource material to help administrators, doctors, nurses and paramedical staffs. The purpose of biomedical waste management are mainly to ensure its

safe handling, as well as safe disposal in such a way that it controls infection and improves safety for employees working in the system. For this, a conscious, coordinated and cooperative efforts has to be made from physicians to ward boys.[6]

A study conducted by Narang et al[8] among dental health care personnel concluded that there is a lack of knowledge, attitude and practice regarding biomedical waste management. However certain studies confirmed that private practitioners have adequate knowledge and positive attitude but they were not practicing diligently regarding biomedical waste management at their own clinics.[9] A systematic review on studies among the dental students, dental staffs, private dentists, class IV employee found inadequate knowledge and awareness with considerable variation in practice and management. Although many studies have been conducted on dental students and interns at their institutions,[10] but limited literature is available assessing the awareness among the practicing dentists. Most of the existing literatures have constrained to assess the knowledge, attitude and practice associated with biomedical waste management but have not attempted to educate the dentist regarding the same. Thus the present study was planned as an attempt to assess the knowledge, attitude and practice as well as the impact of health education regarding biomedical waste management among the private dental practitioners of Madurai city. It is the duty of every health care personal working in a health care institution to take all steps to ensure segregation, safe handling & disposal of bio-medical waste (BMW), without causing any adverse effect to human health and the environment.

REVIEW OF LITERATURE

Vishal Khandelwal et al in 2013 conducted a study to determine the awareness of dental practitioners on hospital generation and handling of waste. A self-administered questionnaire was used. The results showed that there was lack of awareness, ignorance of policy and procedure on the handling of dental healthcare waste and failure to attend educational activities were major defects found among practitioners in the study. And they emphasized that there is a need for a plan to improve the awareness of dental healthcare workers about hospital generated waste and its proper handling.

Alok Sharma in 2013 conducted a study among 144 dentists, nurses, laboratory technicians and Class IV employees (cleaners and maintenance personnel) at Jaipur Dental College. In their research questionnaire was used to assess their knowledge of biomedical medical waste disposal and the resulting answers were graded and the percentage of correct and incorrect answers for each question from all the participants was obtained. Of the 144 questionnaires, 140 were returned and the answers graded. The results showed that there was a poor level of knowledge and awareness of biomedical waste generation hazards, legislation and management among health care personnel, 36% of the nurses had an extremely poor knowledge of biomedical waste generation and legislation and just 15% of the Class IV employees had an excellent awareness of biomedical waste management practice. Hence they concluded from their study that there are poor levels of knowledge and awareness about BM waste generation hazards, legislation and management among health care personnel in Jaipur Dental College. They recommended regular monitoring and training are required at all levels.

Gyan P singh et al in 2014 conducted a study to assess the Knowledge, Attitude and Practices (KAP) regarding healthcare waste management among healthcare personnel in Lucknow District, Uttar Pradesh, India. It was a cross-sectional study conducted amongst medical,

dental, paramedical staff and graduate and postgraduate students of King George's Medical and Dental University, Lucknow, Uttar Pradesh, India. A total of 28 healthcare personnel consented for interview. They have used simple random sampling technique to select the study unit. A predesigned and pretested questionnaire for KAP study was used for data collection. In their study, 83.3% of medical and dental doctors and students had knowledge about waste management plan and its authorization and majority of the medical doctors (83.3%), paramedics (80%) and students (66.7%) had knowledge about place of waste disposal. On practice level, most of the healthcare personnel were using autoclave and lesser number of personnel were using dry heat sterilization. They have concluded that the healthcare personnel were observed to be good in theoretical knowledge as well as practices.

Raghuwar D. Singh et al in 2014 conducted a study to assess the awareness and performance towards dental waste including mercury management policy and practices among the dental practitioners in North India. The study was conducted among 200 private dental practitioners. The survey form was composed of 29 self-administered questions frame based on knowledge, attitude, and those regarding the practices of dentists in relation to dental health-care waste management. In his study about 63.7% of the dentists were not aware of the different categories of biomedical waste generated in their clinics, Only 31.9% of the dentists correctly said that outdated and contaminated drugs come under cytotoxic waste. 46.2% said they break the needle and dispose of it and only 21.9% use needle burner to destroy it. 45.0% of the dentists dispose of the developer and fixer solutions by letting them into the sewer, 49.4% of them dilute the solutions and let them into sewer and only 5.6% return them to the supplier. About 40.6% of the dentists dispose of excess silver amalgam by throwing it into common bin. It was concluded that not all dentists were aware of the risks they were exposed to and only half of them observe infection control practices.

Asgad Adil Mohamed Ahmed et al in 2014 conducted a study to assess Sudanese dentists knowledge, Attitude and Practice towards dental waste disposal management. A descriptive cross-sectional study among 200 dentists of whom 51.5% were males and 48.5% were females (general practitioners 68.5% and 31.5% specialists) working in private clinics in Khartoum locality. Self-administered questionnaire including questions about demographic data, years of experience, specialty and questions regarding the knowledge, attitude and practice towards dental waste management. Completed questionnaires were returned anonymously. The result obtained from this study showed that the majority (96.4%) knew about the harmful effect of dental waste disposal, 97.6% were aware about the transmissible infectious diseases (HIV/ Hepatitis B&C) and 95.2% said that waste should be segregated into categories. The majority (84.2%) of the respondents would like to attend a program on dental waste management, 17.6% agreed that health care is not an issue, yet 76.4% stated that its a financial burden on the clinic and 40% stated that it's an extra work burden. They concluded that the majority of dentists working in private clinics are knowledgeable about dental waste management. The attitude towards dental waste segregation is affected by the financial burden yet there is a need for training programs with an implementation of an annual audit and education within the dental health care centers.

Sanjeev R, Suneesh Kuruvilla et al in 2014 conducted a study to assess the knowledge, attitude and practice of biomedical waste management among dental health care personnel in Kothamangalam, Kerala. This was a cross-sectional questionnaire based survey containing 24 questions to assess the knowledge, attitude and practice on biomedical waste management. The samples were the teaching faculty members and students of 3 dental colleges in Kothamangalam, Kerala. The mean knowledge, attitude and practice scores were 4.35±1.63, 4.69±1.97, 4.43±0.78 respectively with maximum scores of 9, 5 and 10. The study revealed

that although the attitude regarding biomedical waste management among faculty members and students of the institution was high, knowledge and practice remained low.

Kaushal Chaudhari et al in 2015 conducted a study to assess the knowledge, attitude and practices among dentists regarding bio-medical waste management in Ahmedabad city, Gujarat. The study sample included 120 graduate and postgraduate practitioners. The survey was scheduled to spread over a period of 3 months. Data was collected by using self designed questionnaire. The results showed that the majority of the practitioners were having good knowledge regarding biomedical waste management, whereas their attitude towards the same was found little low which is an alarming condition and they were doing fair practice of the same.

Kavita Manchanda et al in 2015 assessed the knowledge, attitude, and practices of students (3rd years, 4th years), interns and teaching staff. A cross-sectional study was conducted using a close-ended questionnaire among the students, interns and teaching staff of three dental colleges in Himachal Pradesh. A total of 578 subjects were included in the study with their prior consent. This study showed that many dentists have the knowledge about the waste management, but they lack in the attitude and practice.

Pawan A Pawar et al in 2016 evaluated the knowledge, attitude and practices of dental care waste management among private dental practitioners in Latur city. This was a cross sectional study conducted among 48 private practitioners practicing in Latur city. The prefabricated validity tested questionnaire was used for the present study. In this study amongst the total respondents 77.08% were males and 22.92% were females while 27.08% were postgraduates and 72.92% were undergraduates. only 20% of undergraduate practitioners knew about ten categories of biomedical waste mentioned by ministry of environment and forest and only half i.e. 50% practitioners knew that contaminated sharps should be disposed in blue/white colored

container. The total no. of 33.3% of dentists directly dispose infected needles in common bin. In this study it has been observed that the most of the practitioners had acceptable knowledge about biomedical waste management but they fail to apply that in their practice. Hence legislations and implementation of various programs will certainly give better effect along with practitioner's positive attitude.

Avani Rijhwani et al in 2016 assessed the knowledge and attitude of bio-medical waste management and Needle Stick Injuries (NSIs) among dental and nursing students of Narsinhbhaipatel Dental College and Hospital and Nootan College of Nursing Visnagar Gujarat. A closed-ended questionnaire was prepared and distributed to the study participants. Total of 15 minutes time was allotted to fill the questionnaire. The anonymity of subjects was maintained. The results obtained was 82.6% of dental and 80.5% of nursing students have sufficient knowledge regarding disease spread by BMW. 72.5% of dental students and 87% of nursing students have sufficient knowledge regarding various methods of disinfection used to treat BMW. 84.1% of dental students and 71.4% of nursing students are vaccinated with Hepatitis vaccine. 87% of dental and nursing students are been vaccinated with TT vaccine every 5 years. The majority of dental (95.1%) and nursing(96.1%) students considers knowledge of BMW as important. 88.4% dental students and 94.8% of nursing students think that training for BMW management should be made compulsory which showed the interest and importance of biomedical waste management training among them. They concluded by saying that The requirement of compulsory training of BMW waste management and prevention NSI injuries should be included in the academic curriculum by all the health institutions.

Ramesh Lakshmikantha et al in 2016 aimed to assess the knowledge, awareness, and attitude/behavior of BM waste generation, hazards, and legislation among the study subjects using self-structured questionnaire. It was a cross-sectional study was conducted in 337

practicing dentists in Bengaluru city for the past 2 months. A self-structured questionnaire was used to obtain required data. The questionnaire was divided into three sections. The first section of the questionnaire contained questions regarding knowledge of BM waste generation, hazards, and legislation, whereas the second section contained questions regarding the level of awareness on BM waste management practice, and the third section contained questions regarding attitude/behavior toward BM waste. Of 337 (100%) study participants, the result obtained was 176 (52.2%) were males and 161 (47.8%) were females. Among 337 (100%) study participants, more than three-fourth, i.e., 291 (88.4%) knew about BM waste generation and legislation, whereas 23 (6.8%) each did not know and were not aware of it. The conclusion of this study reveals there is a good level of knowledge and awareness about BM waste generation hazards, legislation, and management among health care personnel in Bengaluru city. Regular monitoring and training are still required at all levels, and there is a need for continuing dental education on dental waste management practices to these dental practitioners.

Usha GV et al 2016 assessed the level of knowledge, attitude and practice towards dental waste management among undergraduate dental students of Bapuji Dental College and hospital in Davangere city. This study was a descriptive cross - sectional survey conducted among the dental students (140 students) in Davangere city. Knowledge, attitude and practice towards dental waste management was assessed using a structured questionnaire containing 29 items. Out of 140 participants 41(29.3%) were males and 99 (70.6%) were females. Majority (97.9 %) of dental students were aware of the term biomedical waste and almost 72.8 % agreed to the need for disinfection of biomedical waste before disposal. Only 48.6% agreed that infectious waste to be put in yellow plastic bag with bio-hazard symbol. Only few (13.6%) of them use needle burner to destroy it which is the ideal method. They concluded that though dental students have good knowledge but they were not aware of color coding in disposing the infectious waste and not practicing appropriate method of handling the dental waste.

Aasim Farooq Shah et al in 2016 conducted a study to assess the level of awareness and attitude among dental health care workers which included dentists and dental auxiliaries in Kashmir division, Jammu and Kashmir State, India. A total of 408 registered dentists and 456 denta auxiliaries who were working with dentists which included dental hygienists and dental assistants were included in the study. The questionnaire based cross sectional study was conducted among dentists and both operating and non-operating dental auxiliaries. The results of this study was based on the responses of the 864 participants showed dentists had fairly better knowledge than dental auxiliaries and the results were statistically significant. It was observed that only 24.01% of the dentists had an excellent awareness while 64.03% of the Dental auxiliaries had poor awareness regarding biomedical waste management practices. More than 50% of the dentists had an average or good attitude while 60.96% of dental auxiliaries had a poor attitude towards sterilization, disinfection and labelling of biomedical wastes. They concluded that the awareness, knowledge and practices regarding biomedical waste was higher in dentists than dental auxiliaries, however it was not satisfactory.

Deborah Gonmei et al in 2016 assessed the knowledge, attitude and practices of dental postgraduate students regarding biomedical waste management in Bengaluru. This study was conducted among 250 dental postgraduate students using a validated questionnaire in Bengaluru. The questionnaire comprised 35 questions in English with 5 general questions and 10 in each domain (knowledge, attitude and practice). In this study they obtained the results as most of the study participants (58.0%-90.0%) exhibited positive attitudes. With regard to practice questions, 32.0%-70.4% of study participants had correct practice. This study concluded that the participants had poor to moderate knowledge and practice while faring moderate to good in the attitude domain that vary by year of study, gender and specialty.

Rajeev Ranjan et al in 2016 assessed the awareness regarding biomedical waste management as well as knowledge of effective recycling and reuse of dental materials among dental

students. This cross-sectional study was conducted among dental students belonging from all dental colleges of Bhubaneswar, Odisha (India) from February 2016 to April 2016. A total of 500 students (208 males and 292 females) participated in the study, which was conducted in two phases. A questionnaire was distributed to assess the awareness of biomedical waste management and knowledge of effective recycling of dental materials, and collected data was examined on a 5-point unipolar scale in percentages to assess the relative awareness regarding these two different categorizes. In this study forty-four percent of the dental students were not at all aware about the management of biomedical waste, 22% were moderately aware, 21% slightly aware, 7% very aware, and 5% fell in extremely aware category. Similarly, a higher percentage of participants (61%) were completely unaware regarding recycling and reusing of biomedical waste. They concluded that there was lack of sufficient knowledge among dental students regarding management of biomedical waste and recycling or reusing of dental materials.

N.Ashika riswana in 2016 assessed the dental students awareness about dental care waste management. A cross sectional questionnaire study was conducted among 150 dental students of saveetha dental college, Chennai, Tamilnadu, India. A predesigned and pretested questionnaire for the study was used for data collection. They concluded that there is a definite need to create awareness, improve knowledge, inculcate responsible attitude, and adopt proper methods to dispose dental health care waste to minimise its harmful effects.

Anita Rama Kahar et al in 2017 aimed to evaluate BMW education/awareness, awareness of BMW generation, hazard, and legislation and its management practices among the final BDS students and interns of VSPM Dental College and Research Centre, Nagpur, Maharashtra, India. A cross-sectional questionnaire-based study was designed. The questionnaire was consisted of 19 close-ended questions and one open-ended question. It was distributed anonymously among BDS final year students and interns. The solved questionnaire was

collected back after 10 min and the data were analyzed. This study showed that awareness regarding the BMW was good and awareness about its generation; hazards, legislation, and awareness about BMW practices were moderate to poor.

Sheeri Sabir et al in 2017 conducted a study to assess the Knowledge, Attitude and Practices among 140 dental practitioners regarding waste disposal in Dental Clinics of Moradabad district, India. The result of the study concluded that dentist have better knowledge and practice regarding waste generated regularly in the dental clinics. And they recommended that Dental practitioners should upgrade their knowledge about latest development in BMW.

Vinay Kr et al in 2017 assessed the level of Knowledge, attitude and practices (KAP) about biomedical waste management among Dental and Medical interns are follow in their set up. This was a cross sectional study comprises of randomly selected Sample from each of the categories of medical and dental interns comprising 145 interns, 72 medical and 73 dental on rolls. A semi-structured questionnaire was used to obtain information from interns. A pretested, self-administered 16 questionnaire containing questions on Knowledge, Attitude and Practice regarding bio-medical waste management was used. The study showed knowledge of Medical and Dental interns about BMW satisfactory except sharp waste should collect in translucent puncture proof container and incineration, the best method for biomedical waste disposal. Only 55.8% of dental intern and 66.7% of medical intern thought that if waste is not treated then there is chance of infection.56.2% of dental intern and 79.1% of medical intern reported the injury due to improper disposal of sharps item. This study concluded that the Knowledge about the BMW management practices in the intern of institution were satisfactory which may be due to subject was included in curricula of Medical and Dental education.

Muhammad Umar et al in 2017 conducted a study to decide the wakefulness in regards to biomedical (BM) squander management policy & practices and awareness regarding needle-

stick injury among dentists of four different dental hospitals in Peshawar. A cross-sectional KAP study was conducted from December 2016 to March 2017 in four Dental hospitals of Peshawar, using a survey form with closed-ended questions. It was circulated among dental practitioners (having clinical experience of more than two years) through convenience sampling. The questionnaire was utilized to survey their insight into the biomedical medicinal waste transfer and needle stick injuries. Each questionnaire was scored and graded as the excellent, good or poor level of knowledge for each participant. Of the 150 survey forms, 130 were returned and the appropriate responses were reviewed. The outcomes demonstrated that there was a decent level of learning and familiarity with biomedical waste generation hazards, management, and needle stick injuries. Poor level of knowledge on BM waste management practice was found. Nobody had a great level of awareness about biomedical waste management.

Santhosh Kumar et al in 2017 assessed the knowledge, awareness, and practices of dental students regarding biomedical waste (BMW) management. A self-administered structured questionnaire consisting of 16 questions on knowledge, awareness, and practices about BMW management was distributed among 100 students randomly belonging to 3rd year, final year and intern students of Saveetha Dental College, Saveetha University, Chennai. The results revealed that overall, 67% respondents were aware of the existing BMW management policy systems in India. 62% of students were aware about the correct color coding management system for hospital waste management that prevails in India. 86% of students knew about the dental waste categories of materials used in dentistry. 100% practice discarding sharps in the puncture-proof containers. Only 27% of the respondents discarded the extracted tooth in a proper way. Only 51% of them have attended previous training programs on dental waste management. There was also a statistically significant difference of BMW disposal practices among the three groups. They concluded that the majority of dental students in this study have

good level of knowledge and awareness regarding BMW management in dental clinics. And their practice toward BMW disposal was poor. Hence, the knowledge acquired must be put into practice. Intern students have the highest level of knowledge and practices toward dental waste disposal when compared to final year and 3rd year students. Hence, these findings imply that proper training, continuing education programs, and short-term courses about BMW management, and infection control.

ShaileshKumar et al in 2018 assessed the awareness towards dental waste including mercury management and also the awareness of radiological waste, disposal of surgical waste among dental students. This was an epidemiologic survey conducted in 109 dental students. The survey was composed of 21 self-administered questions frame based on knowledge, attitude and those regarding the practice of dentists in relation to dental health-care waste management. The results showed that 43.11% of dental students were aware about more than 50% of questions, 20.18% of dental students were aware about more than 60% of questions and about 36.69% of dental students were not having adequate knowledge of BMW. Awareness per question shows that approximately 42.85% of dental students were aware about more than 50% of questions. Frequency of students attending about 50% of question was about 47.61% whereas 28.57% students attended all 21 questions. It was concluded that not all dental students were aware of the BMW. A large population of the dental students were not practicing proper method of health-care waste disposal, hence there is an utmost need to educate almost the dental practitioners regarding proper practice measure.

Rajeev Kumar Singh et al in 2018 assessed knowledge, attitude and practice regarding bio-medical waste management and to assess impact of awareness classes among dental Undergraduate and Postgraduate students of King George's Medical University, Lucknow Ninety undergraduate and postgraduate students were assessed for their knowledge, attitude and practice regarding biomedical waste management. A self-structured questionnaire

containing 30 questions was given to all the students. In this study postgraduate students showed significantly better knowledge and practice than undergraduate students.

Krishnaveni Marella et al in 2018 assessed the knowledge, attitude and practices about BMW handling among dental practitioners in an urban area of Andhra Pradesh. It was a hospital based cross sectional study was conducted in Kurnool urban area from September 2017 to January 2018. A total of 360 dental practitioners were present in the study area, out of which 320 agreed and gave consent for participation in the study. A pre validated questionnaire was used for the study. Details regarding socio-demographic factors, and on knowledge attitude and practices about biomedical waste management practice were incorporated. The results showed that 43.4% had excellent knowledge, 33.8% good, 19.4% moderate knowledge regarding the BMW management. In this study they recommended that continuing training programs which emphasize on BMW management practices would assist in improving the present situation of safe handling and disposal of health care waste.

Malvika Raghuvanshi et al in 2018 aimed to obtain information about knowledge, execution, and attitude toward biomedical waste (BMW) and its management. In this study, a self-administered closed-ended questionnaire was designed to conduct a cross-sectional survey. It was distributed among 614 dentists (institution associated or private practitioners) in the cities of North India. The questionnaire comprised 36 questions regarding knowledge, execution, and attitude toward BMW and its management. The study showed that 80% private practitioners were aware of the categories of BMW as compared with 100% of institution-associated dentists. However, 41% dentists associated with institution were disposing the chemical waste directly into sewer and a surprising high number of private practitioners were discarding directly without any treatment. Furthermore, regarding the mandatory maintenance of BMW records, 100% institution-associated respondents were aware, whereas only 6.5% private practitioners knew about it. Regarding BMW management not frequently being followed, 78%

of private practitioners believed extra burden as the reason. They concluded that most of the dentists had adequate knowledge regarding BMW policies and its management. Although it was being practiced in mostly all the institutes on a regular basis, the majority of private practitioners were not practicing it due to various reasons, such as financial burden, lack of availability of service, and poor attitude toward its management.

MATERIALS AND METHODS

STUDY DESIGN

A Descriptive study was conducted to assess the effectiveness of health education program on the knowledge, attitude and practice about biomedical waste management among dental practitioners in Madurai city.

STUDY AREA

Madurai is one of the major city in Tamil Nadu and also headquarters of the district. The district is divided into 2 Revenue Divisions. There are 7 taluks. Madurai North and Madurai South. The district has 12 Town Panchayats and 6 Municipalities. Besides Madurai being a Municipal Corporation, 20 Census Towns were classified in the district;10 in Madurai South and 10 in Madurai North. There are 420 Village Panchayats in the district. There are 10 State Assembly Constituencies and 1 Parliament Constituency in the district.

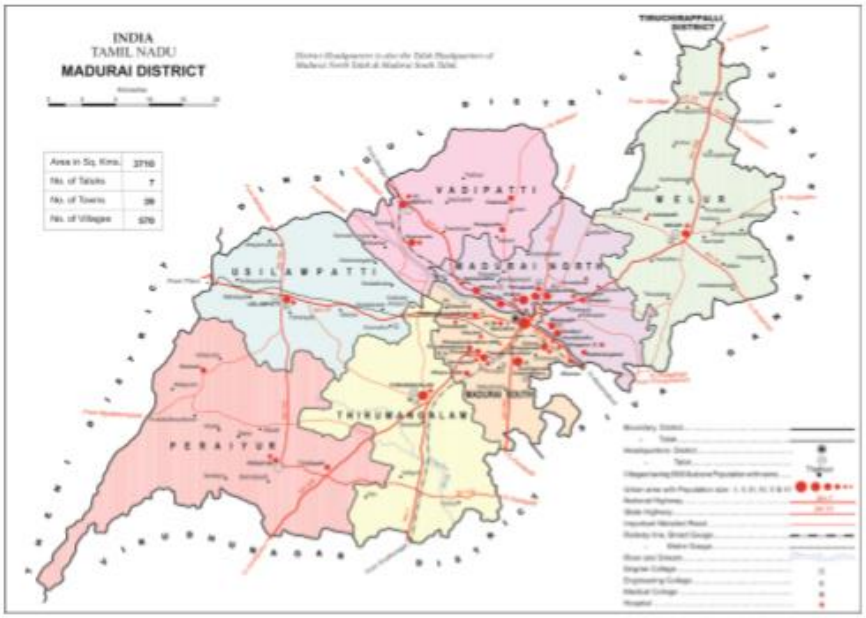


Figure -1 Madurai city map

STUDY POPULATION

The study population includes the private dental practitioners of Madurai city.

CRITERIA FOR SAMPLE SELECTION

Inclusion criteria

The participant should be a qualified (minimal BDS qualification) and registered dentist.

The participant should be a dental practitioner in Madurai city.

The participants who are owning the clinic

Exclusion criteria

Practitioner who do not provide informed consent.

SAMPLE SIZE

A list of private dental practitioners was prepared referring the current DCI registration list(www.tndci.com),, IDA registration list of Madurai and also through snowball sampling the participants were included in the study.

ETHICAL APPROVAL & INFORMED CONSENT

The synopsis of the proposed research was prepared and submitted to the Institutional Review Board Best Dental Science College, Madurai. After the review and scrutiny by the board members of the institutions, approval was granted to conduct the research. Written Informed consent of participants was obtained from the study subjects before the start of the study. Participation in this study was purely on voluntary basis and they were allowed to withdraw from the study at any time if they wish to do so. It was emphasized that strict confidentiality would be maintained at all times and that no names or personal details will be used in the write up of the study.

SOURCE OF DATA

The source of data was primary in nature which was recorded using the pre tested, well-constructed self-administered questionnaire in English to obtain demographic details and information on the biomedical waste management related knowledge, attitude and practice among dental Practitioners in Madurai city.

STUDY PROCEDURE

A list of dental practitioners was prepared by referring current DCI registration(www.tndci.com), IDA registration of Madurai branch and also through snowball sampling. The dentist who are not practicing in Madurai or who have self retired from clinical practice were excluded. A list of 201 dental practitioners was prepared out of which 153 consented for the study. Written Informed consent were obtained from all the participants. All the participants were assured about the confidentiality and anonymity. A well-constructed self-administered questionnaire made in English which has 2 sections in which the 1st section includes demographic details such as the age, sex, DCI registration number, year of service, Degree and contact number and the 2nd section includes the information on the biomedical waste management related knowledge, attitude and practice among Dental practitioners in Madurai city. The questionnaire consisted of 27 close ended questions, consists of 8 questions to assess the knowledge,8 questions to assess the attitude and 11 questions to assess the practice regarding the biomedical waste management. All the questions in the questionnaire were closed ended. All the questions were prepared according to the regulations provided by central government of India and from BWM training manuals[34,35,36]. Questions were prepared in such a way that knowledge questions assessed the awareness, amount of information or understanding about BWM, attitude questions assessed thoughts and feelings of the participants towards BWM and practice questions assessed actions or actual behaviour towards BWM.

Pilot study

A pilot study was done to know the feasibility of the study and to pre-test the questionnaire.

Face/content validity:

The questionnaire was tested for face validity by a panel of "experts" (from the Department Of Public Health Dentistry) and modified in accordance with their recommendations to ensure comprehensive ability. A pilot study was carried out with 25 subjects in order to test items understandability and content validity. Data collected from these participants were used to make final refinements. The levels of missing data was used as an indicator of inappropriate or badly worded questions and that question was re-framed accordingly.

Internal consistency (Reliability):

The questionnaire was constructed in English and the complicated English words were changed into simpler terms so that each and every participants can understand the questions. The internal consistency was assessed by Cronbach'sα. The results of the pilot study showed a good consistency with α values higher than 0.9.

Baseline data:

The baseline data was collected from 153 dental practitioners, before approaching the dental practitioners a prior appointment was obtained. Every day a maximum of 10 dental practitioners were approached.15 minutes was provided to each dental practitioner to complete the questionnaire. If there are more than one dentist in a same clinic, they were made to fill the questionnaire separately.

First intervention:

The health education was provided 15 days after the baseline data collection. Health education regarding the biomedical waste management was imparted employing power point presentation. The power point presentation consisted of introduction to biomedical waste, environmental production act, regarding the actions for violating the act, segregation of biomedical waste according to the colour code (2016) given by the central government of India for the biomedical waste management.[34,35,36]

Second Data Collection

15 days after the first health education the questionnaire assessing the KAP regarding the biomedical waste management was administered to the participants following the baseline date collection protocol to assess the impact of health education.

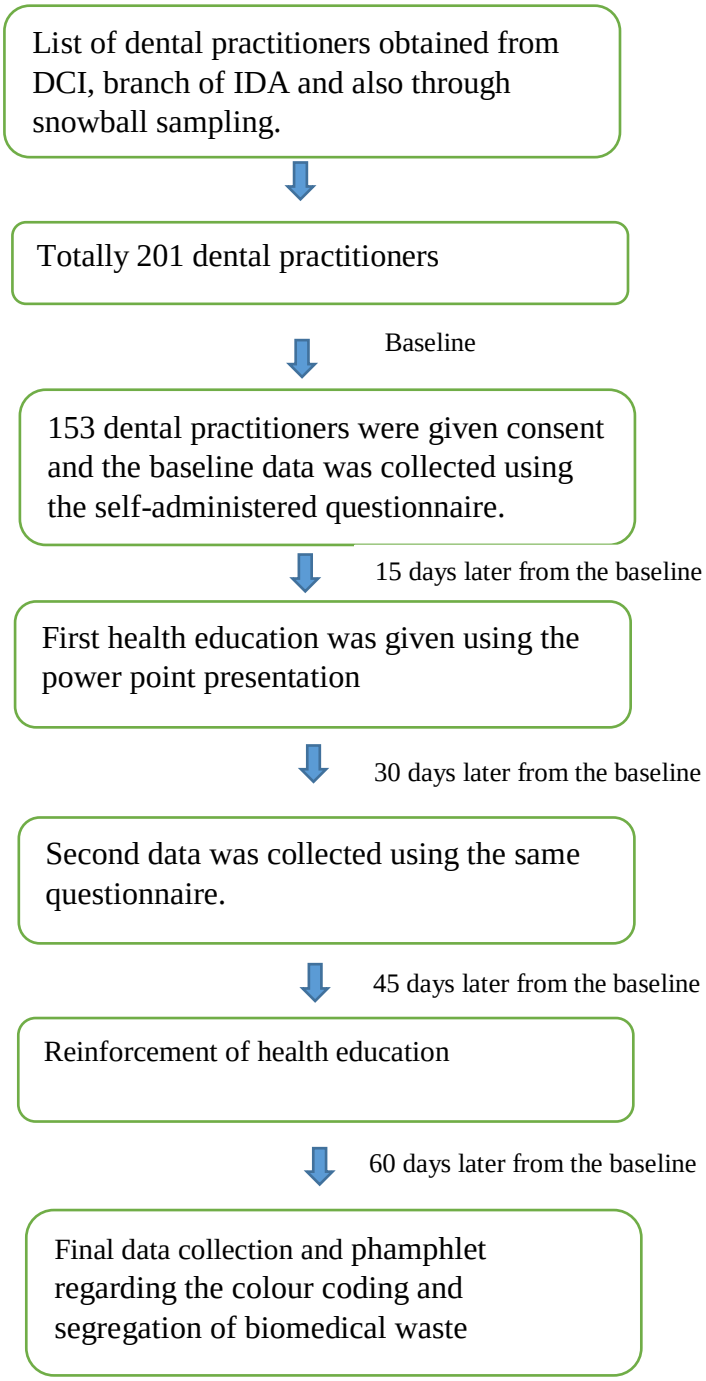
Second intervention:

The second health education was provided 15 days after the second data collection. Health education was provided using the same power point presentation(first intervention) as a means of reinforcement.

Final Data Collection

The final data was collected 15 days after providing the second health education , using the same questionnaire(Baseline data). A phamphlet regarding the colour coding and segregation of biomedical waste management was given to each and every participants at the end of the study.

Figure 2-Methodology



ARMAMENTARIUM

1) Well-constructed self-administered questionnaire
2) Inform consent form
3) Power point presentation in laptop
4) Pamphlet

Statistical Tools

Data collected was entered in an Excel sheet. Each correct and incorrect response and each yes and no questions were given 1 and 0 mark respectively. The maximum score for knowledge section was 8, for attitude section was 8 and for practice section was 11. KAP of each of the participants was measured by corresponding scores in each section of the questionnaire. A self made scoring system was devised to categorize KAP of the study participants as good, fair and poor (fig 2)[33]. Data analysis was done with the help of computer using SPSS Statistical Package- Version 17.Using this software, frequencies, percentages, means, standard deviations, and 'p' values were calculated. A 'p' value less than 0.05 is taken to denote significant relationship.

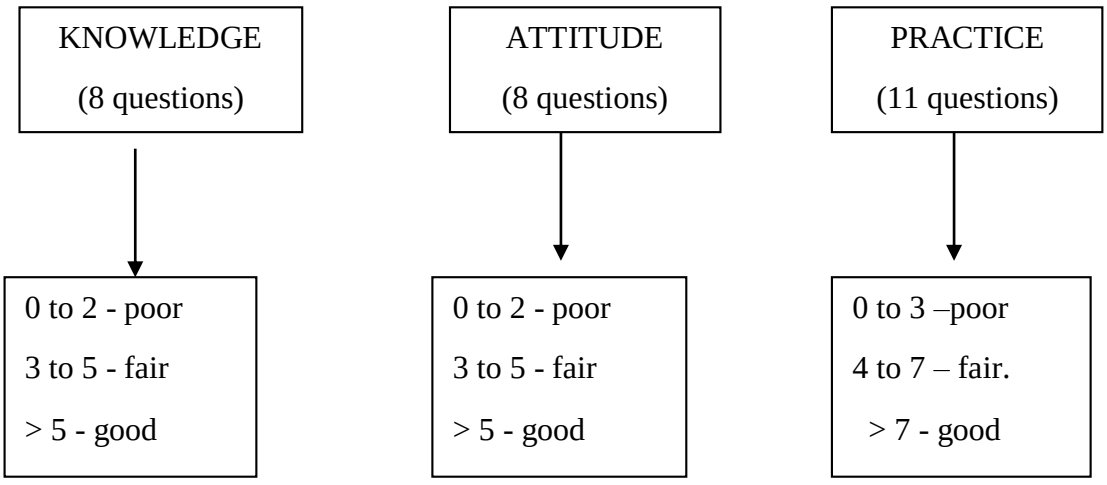
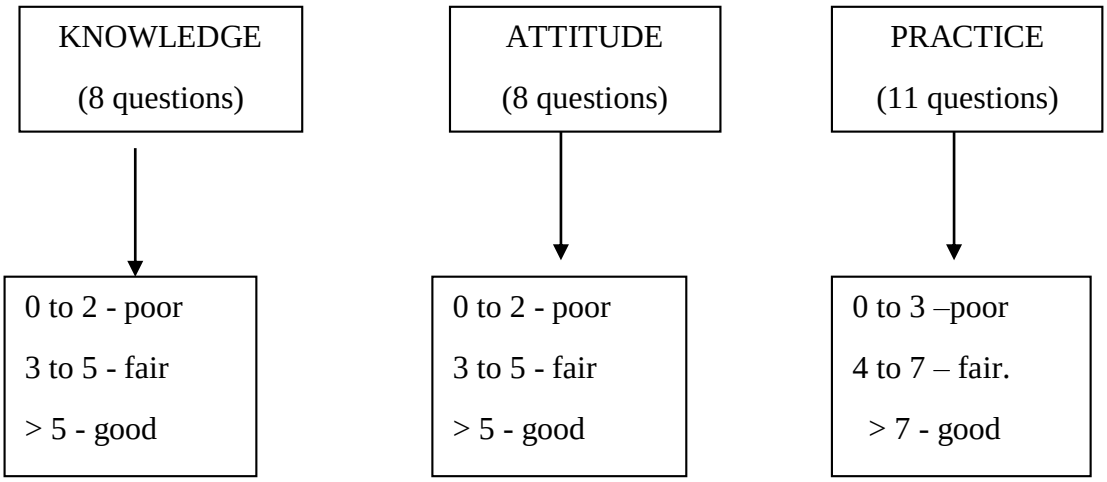


Figure -3 scoring criteria

RESULTS

Statistical Tools

Data collected was entered in an Excel sheet. Then a score of ‘1’ was given for each correct answer and a score of ‘0’ to wrong answers and ‘no answers. The total score(27 questions) and distinct score for questions under knowledge, attitude and practice was calculated for every individual.



Data analysis was done with the help of computer using SPSS Statistical Package- Version 17.Using this software, frequencies, percentages, means, standard deviations, and ‘p’ values were calculated.. A 'p' value less than 0.05 is taken to denote significant relationship.

The total number of participants at the time of start of the study was 152 dental practitioners, at the first intervention there was 4 dropouts in the study hence the number of participants was 148 and at the end of second intervention there was again 8 dropouts in the study therefore the total dental practitioners remained at the end of the study was 140.

Table 1: Age wise distribution of study participants

Age Group	Cases	
	No.	**%**
Up to 30 years	77	50.7
Above 30 years	75	49.3
Total	152	100.0.
Mean ± S.D	31.8 ±7.2 years	

Graph 1: Age wise distribution of study participants

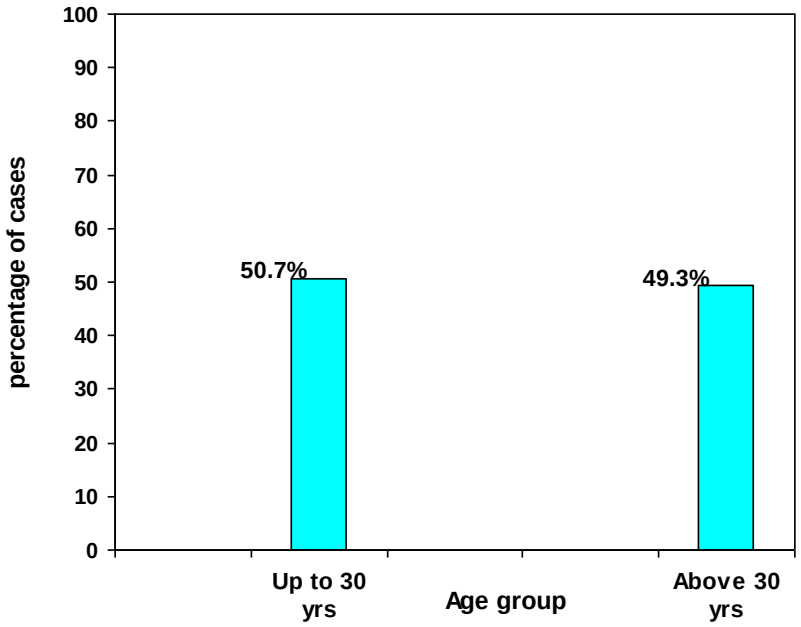


Table 1 and graph 1 shows the age wise distribution of the study participants. The mean age group was 31.8 years, where 50.7 % (77) of the participants were below 30 years of age and 49.3% (75) of the participants were above 30 years of age.

Table 2: Gender wise distribution

Sex	Cases	
	No.	**%**
Male	85	55.9
Female	57	44.1
Total	152	100.0

Graph 2: Gender wise distribution

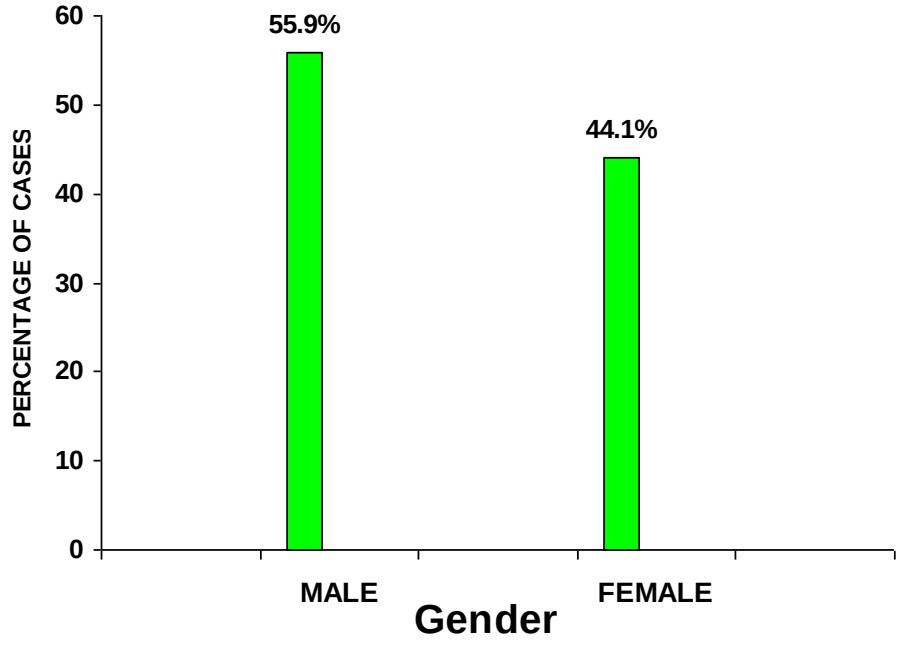


Table 2 and graph 2 projects the gender wise distribution of the study participants. The male participants were 55.9%(85) and the female participants 44.1%(57). This shows the male dental practitioners were higher when compared to female dental practitioners in Madurai city.

Table 3: Distribution of the study participants based on their Qualification.

Qualification	Cases	
	No.	**%**
B.D.S.	105	69.1
M.D.S.	47	30.9
Total	152	100.0

Graph 3: Distribution of the study participants based on their Qualification.

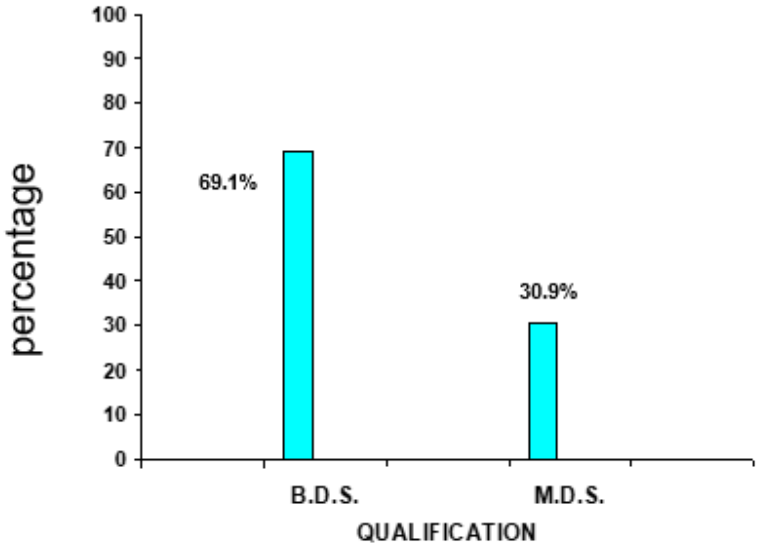


Table 3 and Graph 3 presents the distribution of study participants based on their qualification. Majority of the dental practitioner had BDS qualification and only 30.9% had MDS qualification.

Table 4 : Distribution of the study participants based on the years of service

Years of service	Cases	
	No.	**%**
< 1 year	12	7.9
1 – 5 years	73	48.0
6 – 10 years	35	23.0
Above 10 years	32	21.1
Total	152	100.0
Mean ± S.D	6.76±6.33 years	

Graph 4: Distribution of the study participants based on the years of service

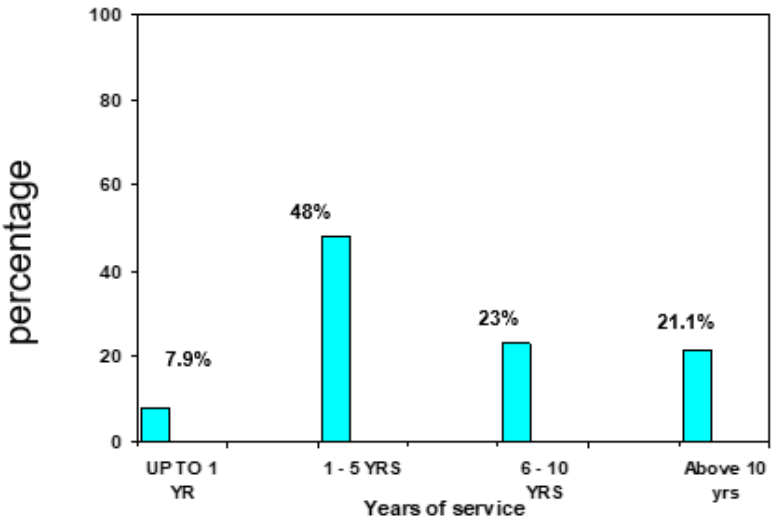


Table 4 and Graph 4 shows the year of service of the dental practitioners who were participated in the study. The mean year of service for the dental practitioners in the study was 6.76 years. 7.9%(12) of the dentist were new practitioners with less than 1 year of practice, dentist having their practice for 1-5 years, 6-10 years and above 10 years were 48%(73), 23%(35) and 21.1%(32) respectively.

Table 5: Percentage of participants answered each options for knowledge based questions.

Questions	Baseline	First intervention	Second intervention
1) Do you know about biomedical waste management? a) Yes b) No	 **85%** **15%**	 **100%** **0%**	 **100%** **0%**
2) Do you think it is important to know about biomedical waste generation? a)Yes b) No	 **98%** **2%**	 **100%** **0%**	 **100%** **0%**
3) Biomedical waste (management & handling) rules were first proposed in: a) 1997 b) 1998 c) 1999 d) 2000	 **24%** **14%** **32%** **29%**	 **22%** **21%** **39%** **18%**	 **21%** **25%** **37%** **17%**
4) Amendments to the biomedical waste (management & handling) rules were made in: a) 2000 b) 2001 c) 2003 d) 2004	 **8%** **17%** **16%** **59%**	 **11%** **26%** **28%** **35%**	 **20%** **30%** **26%** **24%**
5) Are you aware that biomedical waste management rules are applicable to dentists? a)Yes b) No	 **98%** **2%**	 **100%** **0%**	 **100%** **0%**
6) Do you think all the waste generated in the hospitals are hazardous? a)Yes b) No	 **89%** **11%**	 **96%** **4%**	 **100%** **0%**
7) According to national guidelines, what is the maximum time limit for which biomedical waste can be stored? a) 24 hours b) 72 hours c) 48 hours d) Don't know	 **16%** **13%** **8%** **63%**	 **28%** **18%** **21%** **33%**	 **29%** **22%** **33%** **16%**
8) Which of the following is the universally accepted symbol for biohazard?			

a) 	**70%**	**25%**	**19%**
b) 	**9%**	**45%**	**49%**
c) 	**8%**	**16%**	**14%**
d) 	**13%**	**14%**	**18%**

Table 5 shows the percentage of participants answered each options for knowledge based questions. Almost 85% of the participants were aware of biomedical waste management at baseline and at the end of first and second interventions almost all of the participants were aware of the biomedical waste management. Almost (98%) everyone were aware of the rules that was made regarding the biomedical waste management for dentist. Most of the dentist does not knew the maximum time limit for the storage of the biomedical waste at the baseline only 8% of the participants were answered correctly but at the end of second intervention there was a improvement(33%) among study participants. The symbol of the biomedical waste was known only by few participants at the baseline (9%) but at the end of the second intervention it was improved to 49%.

Table 6: Percentage of participants answered each options for attitude based questions

Questions	Baseline	First intervention	Second intervention
1) Do you think safe management of health care waste is important?			
a)Yes	**94%**	**100%**	**100%**
b) No	**6%**	**0%**	**0%**
2) Do you agree that biomedical wastes should be segregated into different categories?			
a)Yes	**91%**	**100%**	**100%**
b) No	**9%**	**0%**	**0%**
3) Do you feel that biomedical waste management should compulsorily be made part of dental undergraduate curriculum?			
a)Yes	**92%**	**100%**	**100%**
b) No	**8%**	**0%**	**0%**
4) Do you think your knowledge regarding biomedical waste management is adequate?			
a)Yes	**19%**	**37%**	**86%**
b) No	**81%**	**63%**	**14%**
5) Do you think you require any further training on biomedical waste management?			
a)Yes	**90%**	**96%**	**100%**
b) No	**10%**	**4%**	**0%**
6) Do you think waste management is also doctor's responsibility?			
a)Yes	**96%**	**100%**	**100%**
b) No	**4%**	**0%**	**0%**
7) Safe management efforts by the hospital increase the financial burden on management.			
a)Yes	**100%**	**100%**	**100%**
b) No	**0%**	**0%**	**0%**
8) Do you think it is important to report to the Pollution Control Board of India about a particular institution if it is not complying with the guidelines for biomedical waste management?			
a)Yes	**67%**	**100%**	**100%**
b) No	**33%**	**0%**	**0%**

Table 6 depicts the percentage of participants answered each options for attitude based questions. 94% of participants agreed that safe management of health care waste is important and 91% biomedical wastes should be segregated into different categories at the baseline and at the end of the second intervention almost everyone agreed. 91% of the participants at the baseline felt that biomedical waste management should compulsorily be made part of dental undergraduate curriculum at the end of the second intervention all the participants agreed. All the participants agreed that they do not have adequate knowledge at the baseline(81%**)** regarding biomedical waste and they also need further training at the baseline(90%) and even at the end of the second intervention all the participants accepted that they still need to acquire knowledge and also they need further training(100%) .Each and every study participants felt that safe management of biomedical waste increases the financial burden(100%) on the hospital management throughout the study.

Table 7 Percentage of participants answered each options for practice based questions

Questions	Baseline	First intervention	Second intervention
1) Does your clinic have a tie up with waste management companies?			
a)Yes	**1%**	**3%**	**7%**
b) No	**99%**	**97%**	**93%**
2) Do you have needle destroyer for discarding the used needles?			
a)yes	**22%**	**32%**	**35%**
b) no	**78%**	**68%**	**65%**
3) Do you segregate the biomedical waste according to different categories?			
a)Yes	**2%**	**2%**	**7%**
b) No	**98%**	**98%**	**93%**
4) Where do you dispose cotton, gauze and other items contaminated by blood?			
a) Red plastic bag	**2%**	**2%**	**1.8%**
b) Yellow plastic bag	**2%**	**3.3%**	**5.2%**
c) General garbage	**96%**	**94%**	**92.3%**
d) Blue plastic bag	**0%**	**0.7%**	**0.7%**
e) White plastic bag	**0%**	**0%**	**0%**
5) Where do you dispose pharmaceutical waste?			
a) Red plastic bag	**0%**	**0%**	**0%**
b) Yellow plastic bag	**0%**	**1.3%**	**3.6%**
c) General garbage	**100%**	**98%**	**95.7%**
d) Blue plastic bag	**0%**	**0%**	**0.7%**
e) White plastic bag	**0%**	**0.7%**	**0%**
6) Where do you dispose used syringe ?			
a) Red plastic bag	**0%**	**0.7%**	**3.6%**
b) Yellow plastic bag	**0.5%**	**0.7%**	**0.7%**
c) General garbage	**98.5%**	**98.5%**	**95.7%**
d) Blue plastic bag	**0%**	**0%**	**0%**
e) White plastic bag	**1%**	**0%**	**0%**
7) Where do you dispose metal sharps?			
a) Red plastic bag with Puncture poof container	**1%**	**1%**	**0%**
b) Yellow plastic bag with Puncture poof container	**2%**	**1%**	**0.7%**
c) General garbage with Puncture poof container	**95.5%**	**93%**	**92.8%**
d) Blue plastic bag with Puncture poof container	**1%**	**1.3%**	**2.2%**
e) White plastic bag with Puncture poof container	**0.5%**	**3.7%**	**4.3%**
8) How do you discard the broken glass wares?			
a) Red plastic bag	**1.3%**	**0.7%**	**1.4%**
b) Yellow plastic bag	**0.7%**	**1.3%**	**0.7%**
c) General garbage	**95.4%**	**95.3%**	**90.7%**
d) Blue plastic bag	**2.6%**	**0.7%**	**6.4%**
e) White plastic bag	**0%**	**2%**	**0.7%**
9) Where do you dispose the used fixer and developer solution?			
a) Red plastic bag	**3%**	**1.3%**	**1.4%**
b) Yellow plastic bag	**3%**	**2.7%**	**4.2%**
c) General garbage	**91%**	**94%**	**93.7%**
d) Blue plastic bag	**0%**	**1.3%**	**0.7%**
e) White plastic bag	**3%**	**0.7%**	**0%**

10) Where do you dispose the orthodontic brackets and wires?			
a) Red plastic bag	**2%**	**0.7%**	**0%**
b) Yellow plastic bag	**1%**	**2%**	**1.4%**
c) General garbage	**95%**	**94.7%**	**93%**
d) Blue plastic bag	**1%**	**1.3%**	**0.6%**
e) White plastic bag	**1%**	**1.3%**	**5%**
11) Are you using personal protective measures while handling biomedical waste management?			
a)Yes	**55%**	**65%**	**91.5%**
b) No	**45%**	**35%**	**8.5%**

Table 7 shows the percentage of participants answered each options for practice based questions. According to the present study almost 99% of the participants answered that they don't have tie-up with the waste management companies to dispose the biomedical waste but at the end of the second intervention 7% of the participants have made tie-up with the waste management companies. Questions regarding the disposal of biomedical waste almost every one answered that they were disposing the waste in the general garbage but at the end of the second intervention there was a minimal improvement in the disposing pattern of biomedical waste.

Table 8: Mean scores of Knowledge, Attitude and Practice at baseline

Score in	Maximum possible Score	Baseline score Mean ± S.D
Knowledge	8	4.2 ±0.54
Attitude	8	6.03 ±0.47
Practice	11	2.11 ±0.81
Total	27	12.33 ±1.37

Graph 5: Mean scores of Knowledge, Attitude and Practice at baseline

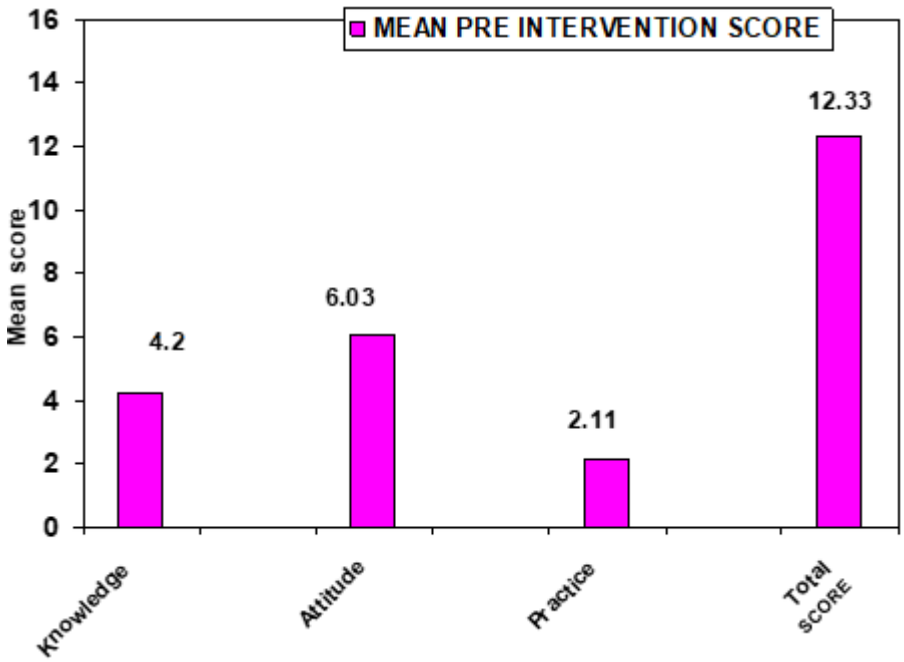


Table 8 and Graph 5 displays the baseline scores of the Knowledge, Attitude and Practice regarding the biomedical waste management among dental practitioners in Madurai city. The mean score for Knowledge was 4.2, Attitude was 6.03 and Practice was 2.11.

Table 9 : Mean scores of Knowledge, Attitude and Practice after first health education

Scores in	Maximum possible Score	scores after first health education
		Mean ± S.D
Knowledge	8	5.03 ± 1.13
Attitude	8	6.82 ± 0.8
Practice	11	2.24 ±0.84
Total	27	14.1 ±1.94

Graph 7: Mean scores of Knowledge, Attitude and Practice after first health education

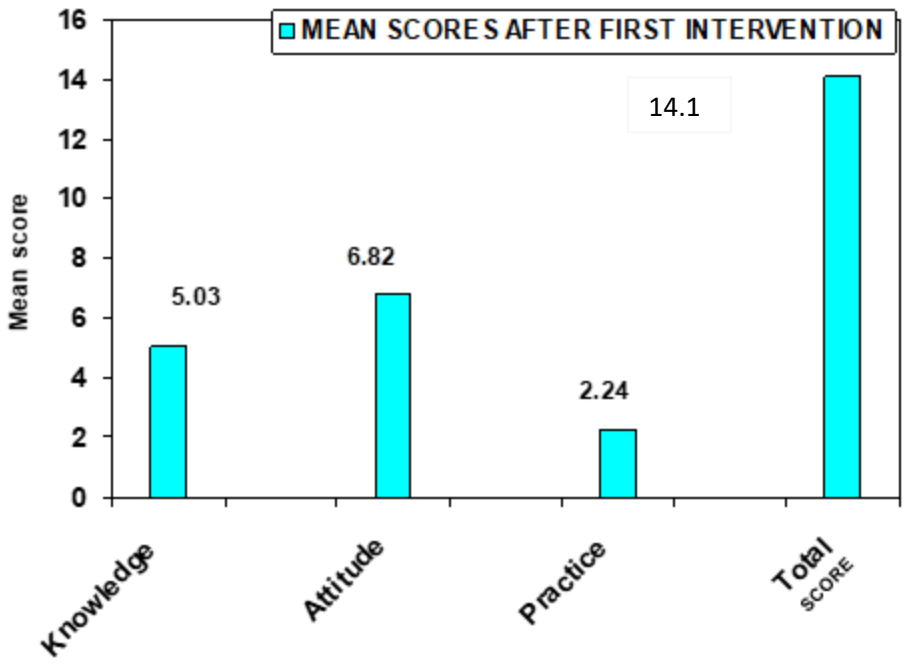


Table 9 and Graph 6 shows the first intervention scores of the Knowledge, Attitude and Practice regarding the biomedical waste management among dental practitioners in Madurai city. The mean score for Knowledge was 5.03, Attitude was 6.82 and Practice was 2.24.

Table 10 : Mean scores of Knowledge, Attitude and Practice after second health education

Scores in	Maximum possible Score	Scores after second health education
		Mean ± S.D
Knowledge	8	6.19 ±1.13
Attitude	8	7.16 ±0.6
Practice	11	2.48±1.38
Total	27	15.83 ±2.23

Graph 7: Mean scores of Knowledge, Attitude and Practice after second health education

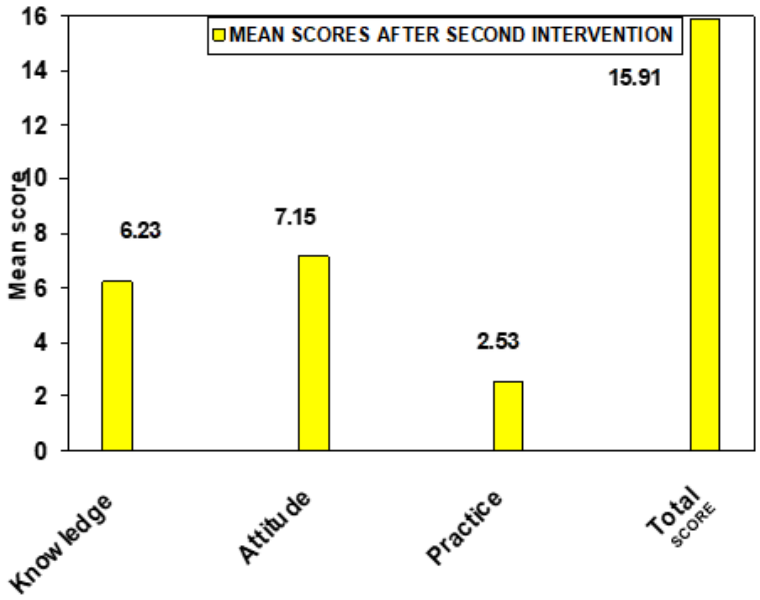


Table 10 and Graph 7 depicts the second health education scores of the Knowledge, Attitude and Practice regarding the biomedical waste management among dental practitioners in Madurai city. The mean score for Knowledge, Attitude and Practice was 6.19, 7.16 and 2.48 respectively.

Table 11 : Levels of Knowledge, Attitude and Practice at baseline

Score levels in	Score levels- baseline					
	Poor		Fair		Good	
	No.	%	No.	%	No.	%
Knowledge	0	0	150	98.7	2	1.3
Attitude	0	0	1	0.7	151	99.3
Practice	151	99.3	0	0	1	0.7
Total	0	0	151	99.3	1	0.7

Graph 8: Levels of Knowledge, Attitude and Practice at baseline

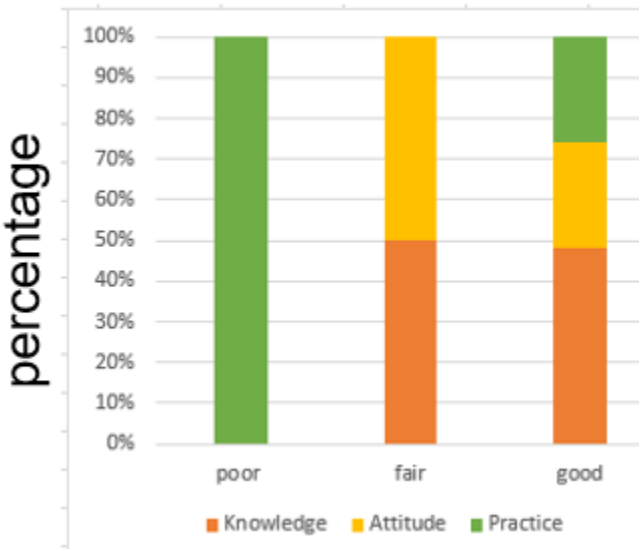


Table 11 and Graph 8 shows the baseline score levels of the Knowledge, Attitude and Practice regarding the biomedical waste management among dental practitioners in Madurai city. 98.7% of the dental practitioners have fair and 1.3% of the dental practitioners have good Knowledge regarding the biomedical waste management. 0.7% of the dental practitioners have fair, 99.3% have positive attitude regarding the biomedical waste management. 99.3% of the dental

practitioners have poor, 0.7% have good practice associated with the biomedical waste management.

Table 12 : Levels of Knowledge, Attitude and Practice at first intervention

Score levels in	Score levels after first intervention					
	Poor		Fair		Good	
	No.	%	No.	%	No.	%
Knowledge	0	0	102	68.9	46	31.1
Attitude	0	0	6	4.1	142	95.9
Practice	145	98.0	2	1.3	1	0.7
Total	0	0	146	98.7	2	1.3

Graph 9: Levels of Knowledge, Attitude and Practice at first intervention

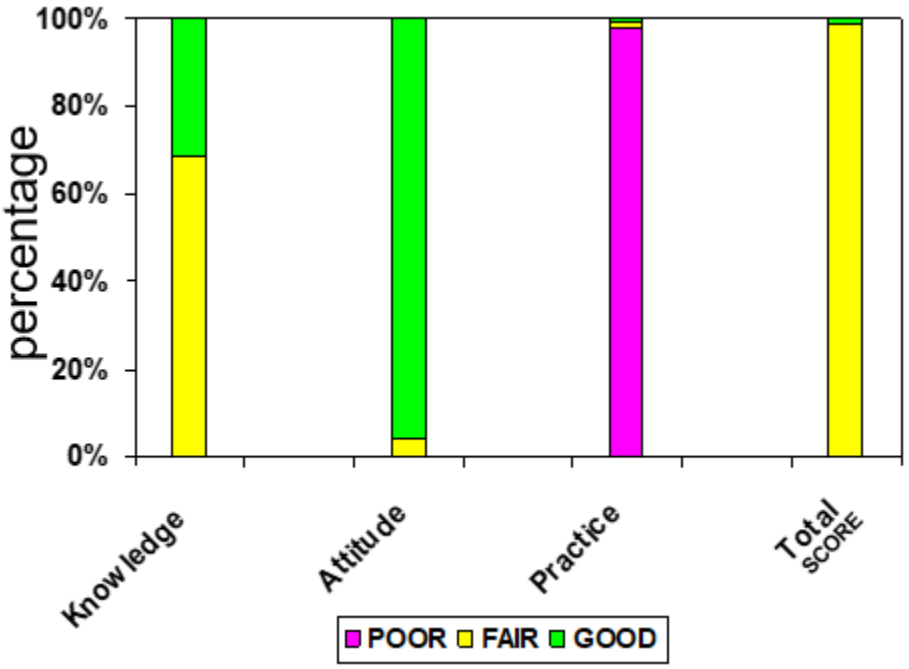


Table 12 and Graph 9 depicts the level of the Knowledge, Attitude and Practice regarding the biomedical waste management among dental practitioners in Madurai city. Majority of the dental practitioners (68.9%) have fair , 31.1% have good Knowledge, 4.1% of the dental practitioners have fair, 95.9% have good attitude, almost all the dental practitioners have poor practice associated with biomedical waste management.

Table 13: Levels of Knowledge, Attitude and Practice at second intervention

Score levels in	Score levels After Second intervention					
	Poor		Fair		Good	
	No.	%	No.	%	No.	%
Knowledge	0	0	45	32.1	95	67.9
Attitude	0	0	0	0	140	100.0
Practice	125	89.3	10	7.1	5	3.6
Total	0	0	125	89.3	15	10.7

Graph 10: Levels of Knowledge, Attitude and Practice at second intervention

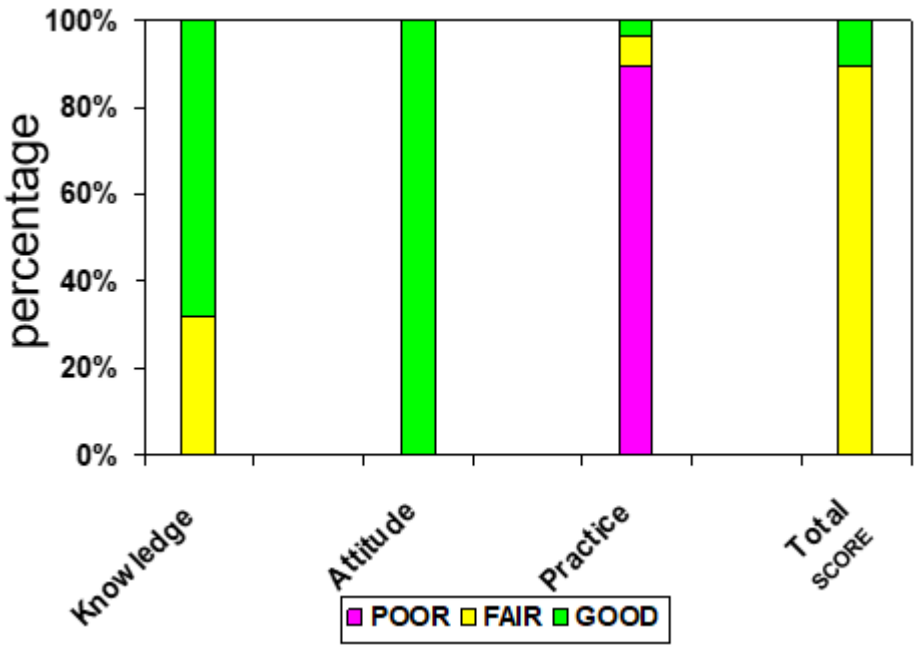


Table 13 and Graph 10 projects the second intervention score levels of the Knowledge, Attitude and Practice regarding the biomedical waste management among dental practitioners in Madurai city. 32.1% of the dental practitioners have fair, 67.9% have good Knowledge, and all of them had positive attitude, 89.3% had poor and 3.6% had good practice regarding the biomedical waste management.

Table 14 : Levels of Knowledge at baseline, first intervention and second intervention

Knowledge score levels	Knowledge score levels during					
	Pre intervention		After First intervention		After Second intervention	
	No.	%	No.	%	No.	%
Poor	0	0	0	0	0	0
Fair	150	98.7	102	68.9	45	32.1
Good	2	1.3	46	31.1	95	67.9

Graph 11: Levels of Knowledge at baseline, first intervention and second intervention

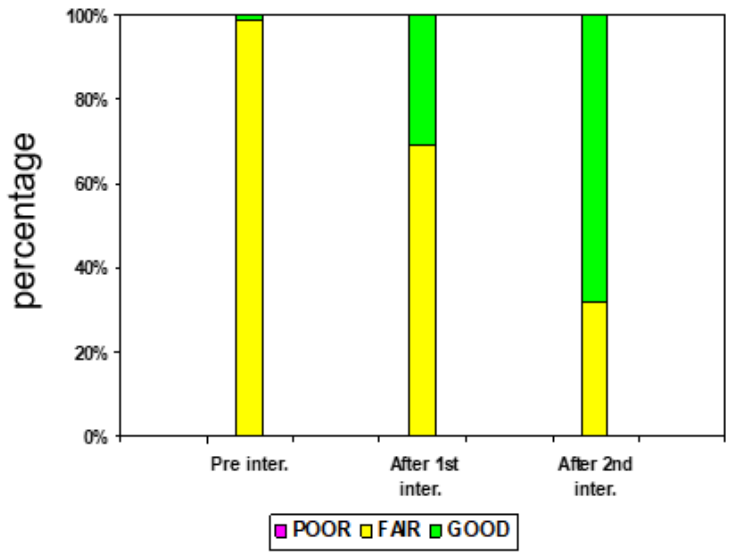


Table 14 and Graph 11 shows the changes in knowledge levels among study participants regarding biomedical waste management. There was a consistent increase in the level of knowledge after each intervention, at baseline only 1.3% had good knowledge which increase after 1st health education to 31.1% and 67.9% after 2nd health education.

Table 15: Levels of attitude at baseline, first intervention and second intervention

Attitude score levels	Attitude score levels during					
	Baseline		After First intervention		After Second intervention	
	No.	%	No.	%	No.	%
Poor	0	0	0	0	0	0
Fair	11	7.2	6	4.1	0	0
Good	141	92.8	142	95.9	140	100.0

Graph 12: Levels of attitude at baseline, first intervention and second intervention

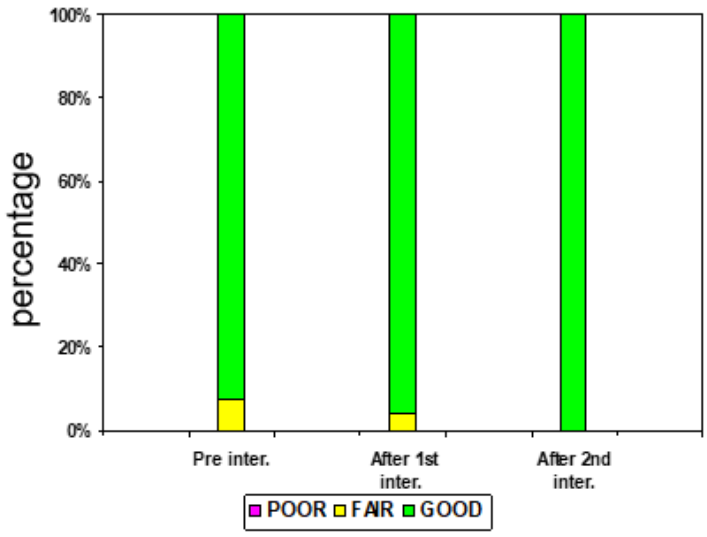


Table 15 and Graph 12 presents the changes in attitude levels among study participants regarding biomedical waste management. The level of attitude consistently increase after every intervention, at baseline it was 92.8%, at 1st intervention it was 95.9% and at 2nd intervention all the participants had positive attitude towards the biomedical waste management.

Table 16: Levels of biomedical waste management Practice at baseline, first intervention and second intervention

Practice score levels	Practice score levels during					
	Baseline		After First intervention		After Second intervention	
	No.	%	No.	%	No.	%
Poor	151	99.3	145	98.0	125	89.3
Fair	0	0	2	1.3	10	7.1
Good	1	0.7	1	0.7	5	3.6

Graph 13: Levels of biomedical waste management Practice at baseline, first intervention and second intervention

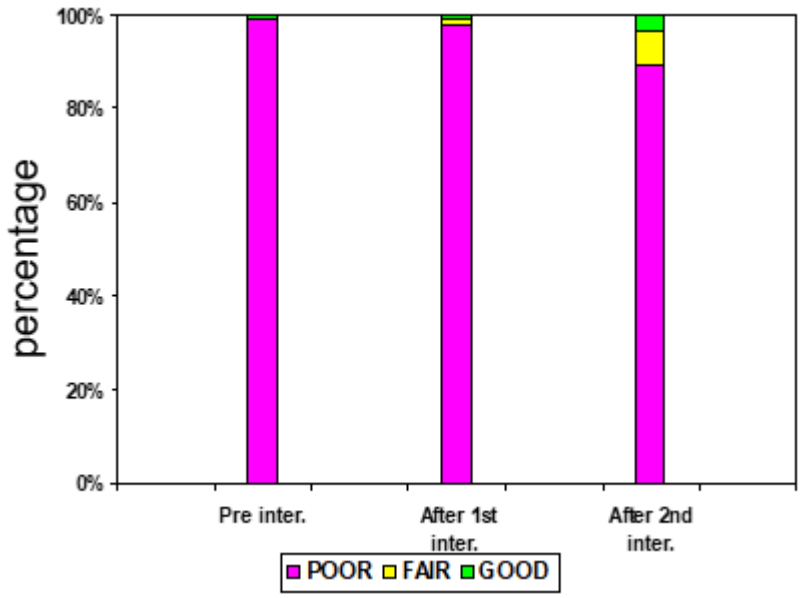


Table 16 and Graph 13 projects the changes regarding the improvement of the participants towards the regular practice of practice of biomedical waste management. At baseline and after the first intervention 0.7% had good practice which increased after 2st intervention to 3.6%.

Table 17 : Levels of knowledge, attitude and practice at baseline, first intervention and second intervention

Total score levels	Total score levels during					
	Baseline		After First intervention		After Second intervention	
	No.	%	No.	%	No.	%
Poor	0	0	0	0	0	0
Fair	151	99.3	146	98.7	125	89.3
Good	1	0.7	2	1.3	15	10.7

Graph 14: Levels of knowledge, attitude and practice at baseline, first intervention and second intervention

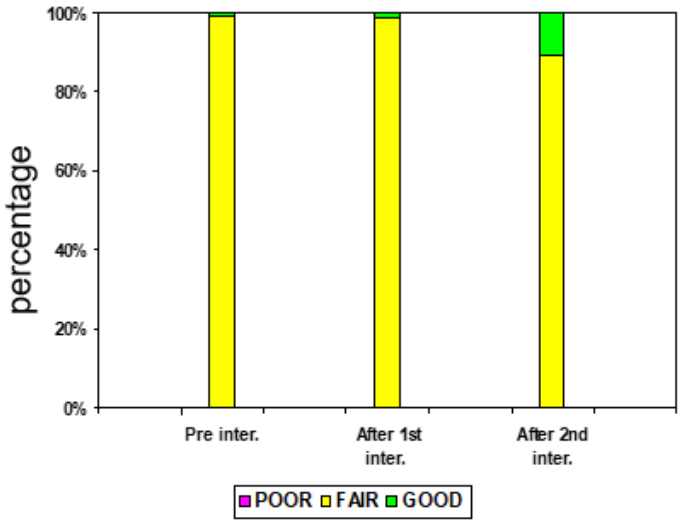


Table 17 and Graph 14 depicts the changes in knowledge, attitude and practice levels in total among study participants regarding biomedical waste management. The total level of knowledge, attitude and practice consistently increase after each intervention, at baseline only 0.7% had good knowledge, attitude and practice which increase after 1st intervention to 1.3% and 10.7% after 2nd intervention.

Table 18 : Mean knowledge, attitude and practice scores at each interventions.

Scores during	Scores (Mean ± S.D.) in			
	Knowledge	**Attitude**	**Practice**	**Total**
Baseline	4.2 ± 0.54	6.03 ± 0.47	2.11 ± 0.81	12.33 ± 1.37
After first intervention	5.03 ± 1.13	6.82 ± 0.8	2.24 ± 0.84	14.1 ± 1.94
Mean difference after first intervention	0.83 ± 1.16	0.79 ± 0.8	0.13 ± 0.41	1.83 ± 1.64
'p' value between baseline and first intervention	< **0.001** **Significant**	< **0.001** **Significant**	0.073 Not significant	< **0.001** **Significant**
After second intervention	6.23 ± 1.15	7.15 ± 0.65	2.53 ± 1.4	15.91 ± 2.2
Mean difference after second intervention	2.04 ± 1.21	1.18 ± 0.61	0.41 ± 1.14	3.6 ± 1.98
'p' value between baseline and second intervention	< **0.001** **Significant**	< **0.001** **Significant**	**0.002** **Significant**	< **0.001** **Significant**

Graph 15: Mean knowledge, attitude and practice scores at each interventions.

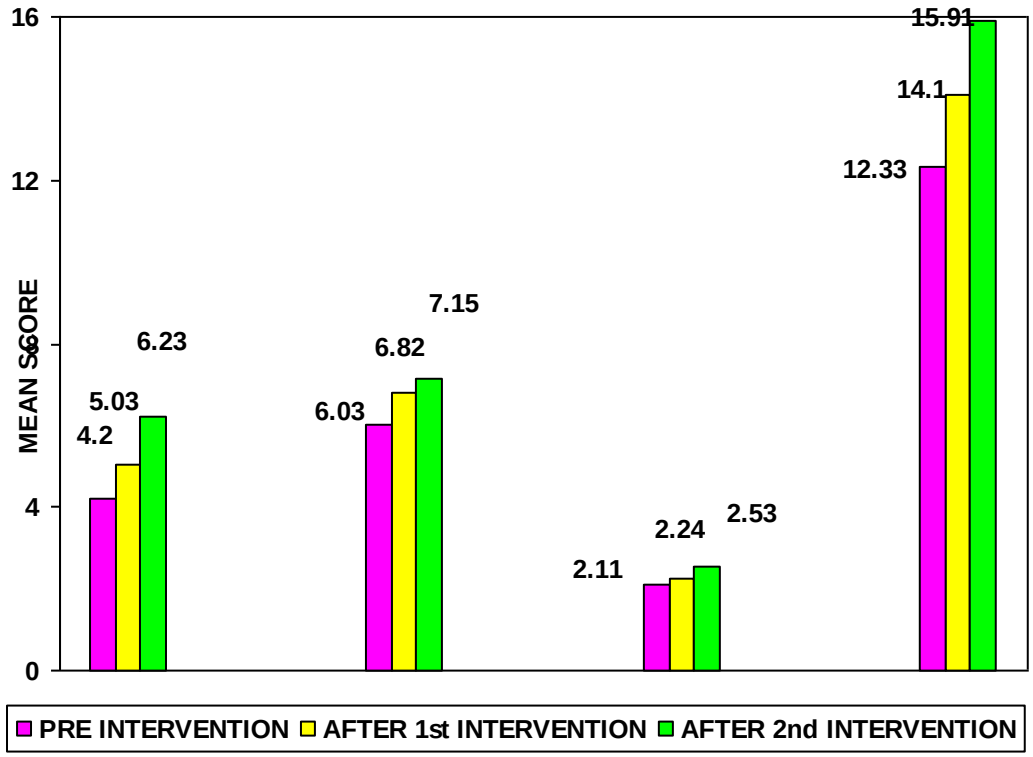


Table 18 and Graph 15 shows the change in mean scores of knowledge, attitude and practice among study participants at baseline, 1st intervention and 2nd intervention. The total mean difference after the first intervention and second intervention was 1.83 and 3.6 respectively.

Table 19 : Mean difference in the Knowledge, Attitude and Practice scores according to the Age distribution

Age Group	**Changes in total scores after second intervention**
	Mean difference ± S.D
Up to 30 years	2.69 ±1.42
Above 30 years	4.58 ± 2.04

Graph 16: Mean difference in the Knowledge, Attitude and Practice scores according to the Age distribution

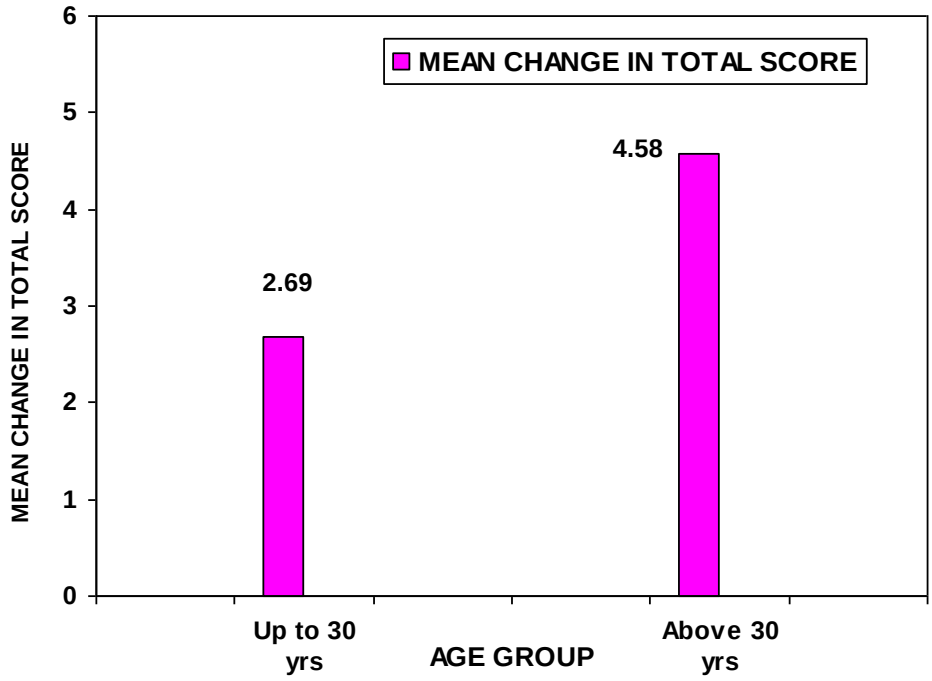


Table 19 and Graph 16 presents the age wise mean difference in the Knowledge, Attitude and Practice regarding the biomedical waste management among dental practitioners in Madurai city after the second intervention. It is observed that practitioners above 30 years have higher mean difference(4.58) and below 30 years have lower mean difference(2.69).

Table 20 : Mean difference in the Knowledge, Attitude and Practice scores according to the gender distribution

Gender Group	Changes in total scores after second intervention
	Mean difference ± S.D
Male	3.68 ±1.81
Female	3.52 ±2.17

Graph 17: Mean difference in the Knowledge, Attitude and Practice scores according to the gender distribution

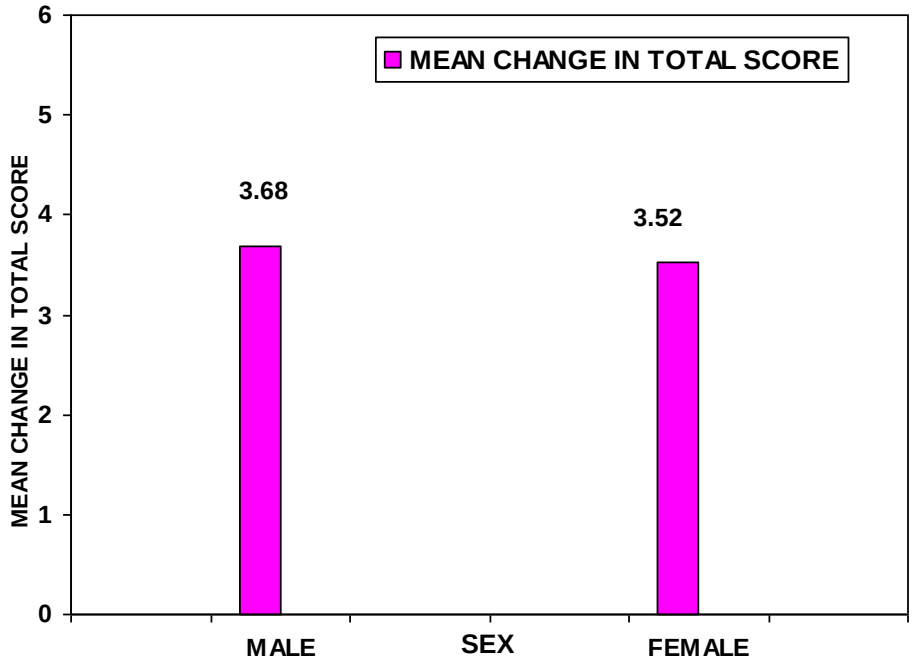


Table 20 and Graph 17 shows the gender wise mean difference in the Knowledge, Attitude and Practice regarding the biomedical waste management among dental practitioners in Madurai city after the second intervention. The mean difference in scores among males (3.68) and females (3.52) was almost equal.

Table 21: Mean difference in the Knowledge, Attitude and Practice scores according to the Qualification

Qualification	Changes in total scores after second intervention
	Mean difference ± S.D
B.D.S.	2.9 ±1.4
M.D.S.	5.19 ±2.17

Graph 18: Mean difference in the Knowledge, Attitude and Practice scores according to the Qualification.

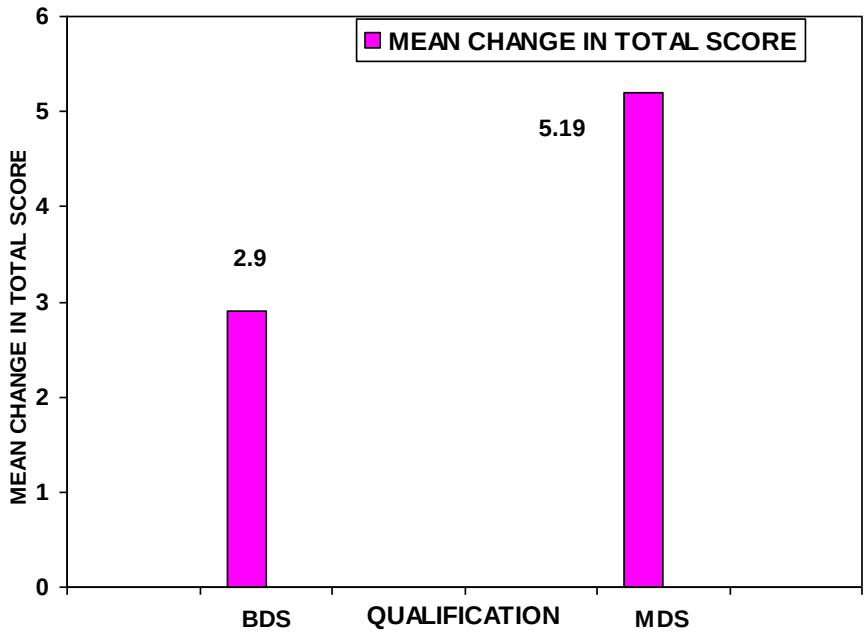


Table 21 and Graph 18 projects the mean difference in the Knowledge, Attitude and Practice according to the qualification. The dental practitioners with the MDS degree (5.19) had higher mean difference in KAP score when compared to practitioners having BDS degree (2.9).

Table 22 : Mean difference in the Knowledge, Attitude and Practice scores according to the year of service.

Years of service	**Changes in total scores after second intervention**
	Mean ± S.D
< 1 year	2.4 ±1.08
1 – 5 years	2.87 ±1.49
6 – 10 years	4.5 ±1.98
Above 10 years	4.82 ±2.26

Graph 19: **Mean difference in the Knowledge, Attitude and Practice according to the year of service.**

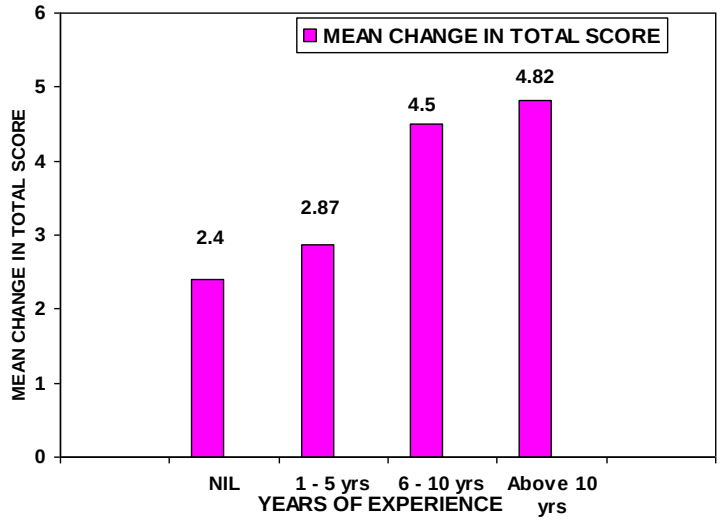


Table 22 and Graph 19 depicts the mean difference in the Knowledge, Attitude and Practice according to the year of service. It was observed that the higher score was obtained by the dental practitioners who were in practice for 6-10 years (4.5) and above 10 years (4.82), when compared to the dental practitioners who had the year of service for < 1 year (2.4) and 1 – 5 years (2.87).

DISCUSSION

Waste generated in a dental hospital is similar to that generated by other hospitals which include a large component of general waste and a smaller proportion of hazardous waste. Dental professionals are at a greater risk for acquiring cross infection while treating patients. This is evident from the fact that most of the human pathogens have been isolated from oral secretions. Dental hospitals use instruments and materials that are directly exposed to blood and saliva and are therefore potential sources of infection. Many chemicals such as acrylics, impression materials, and mercury used for restorative purposes have a environmental and human health impact if not handled properly. Concern regarding BMW is mainly due to the presence of pathogenic organisms and organic substances having adverse effect on human health. There could be significant numbers of organisms in the waste, including virulent strains of viruses and pathogenic bacteria. Dental practice involves many hazardous exposures and this calls for proper segregation and disposal of BMW. [10]

The present research was conducted to assess the effectiveness of health education program on the knowledge, attitude and practice regarding biomedical waste management among dentist in Madurai city. The present research also attempted to create awareness among the dental practitioners in Madurai city. This was the first study to provide interventions using health education to increase the knowledge, attitude and practice regarding biomedical waste management among the dental practitioners. The total number of participants at the time of start of the study were 152. At the first intervention there were 4 dropouts and at the end of second intervention there were 8 dropouts in the study therefore the total dental practitioners at the end of the study were 140. The dropouts were due to that those dentist were out of station to attend the educational conferences/ academic courses. All the participants were assured about the confidentiality and anonymity to reduce the social desirability bias. To

include the dental practitioners of Madurai the DCI(www.tndci.com) Website, members of IDA branch of Madurai and snowball sampling were used to include all the practicing dentists of Madurai and to have the representation of entire population(Dental practitioners). A list of 201 dental practitioners was prepared by referring current DCI registration(www.tndci.com), IDA registration of Madurai branch and also through snowball sampling and excluding the dentist who are not practicing in Madurai or who have self retired from clinical practice. The scoring criteria for the present study includes the maximum score for knowledge section was 8, for attitude section was 8 and for practice section was 11. A score of 0 to 2 was categorized as poor, 3 to 5 as average and > 5 as good for knowledge and attitude questions. For practice questions a score of 0 to 3 was categorized as poor, 4 to 7 as average and > 7 as good. The comparison between the similar studies were limited since the endeavor to educate the dental practitioners was not done regarding the biomedical waste management. In the current study 55.9% were male and 44.1% were female private dental practitioners suggestive of higher male practitioner than female in Madurai city. This finding is in line with other studies were male dental practitioners were comparatively more than female dental practitioners. Majority of the dental practitioners had BDS(69.1%) qualification and only 30.9% had MDS qualification in the present research which is similar to the study done by Malvika et al[32] where the dental practitioners with BDS qualification was higher, whereas in a study conducted by krishnaveni et al[31] MDS(84.7%) qualified dentist were higher than BDS(15.3%)qualified dentist which is in disagreement with present research. This may be due to the level of interest in undergoing postgraduation differs from one state to another state.

A research conducted by Malvika et al[32] among dental practitioners showed that 6.5% of private practitioners were aware of the process of biomedical waste management respectively. The result of this study was in contrast to the result obtained in the current study where 100%(fair - 98.7%, good-1.3%) were aware of the process of biomedical waste management

.Similar results were obtained in the studies by Ipshita Potlia et al[40] (91.70%), Krishnaveni et al[31] (75%), Gyan P singh et al[13] (83.3%), were majority of the dental practitioners were aware about the BMW, awareness is also higher among the dentist associated with institutes as presented in study by Alok Sharma et al[12] (75%) . In a study conducted by Anita Rama Kahar et[24] and Sanjeev R et al[15] among final year BDS students and interns showed that awareness regarding the biomedical waste management was good whereas in the present study the study participants were private dental practitioners who showed the good knowledge which is in line with the present study, which shows that students knowledge regarding biomedical waste management which was inculcated in their dental institutions were retained and this shows that the update regarding the biomedical waste management in the academics were insufficient.

Raghuwar D. Singh et al[6] conducted a research on 200 private dental practitioners in Uttar Pradesh regarding the dental health-care waste management, the result of the research showed that 63.7% of the dentists were not aware of the different categories of biomedical waste generated in their clinics. A contradictory result to this obtained in the present study that all the participants were aware of the different categories of biomedical waste. Similar results was obtained in studies conducted by Malvika et al[32] (89%) in Odisha and Nor Masitah et al[39] (87.8%) in Chennai. In the present study that almost all the participants (98%) were aware of the biomedical waste generation and legislation which was similar to the results obtained by Ramesh Lakshmi kantha[20] where 88.4% knew about biomedical waste generation and legislation. Although they were aware about the legislative policies but the knowledge and practice was inadequate with the amendment of the clinical establishment act 2018 it can be anticipated that more stringent protocol of BMW waste disposal will be ahead and followed. Avani Rijhwani et al[19] conducted a research among dental students where she found that majority of dental (95.1%) students considers knowledge of biomedical waste management as important and 88.4% dental students think that training for biomedical waste management

should be made compulsory which showed the interest and importance of biomedical waste management training among them, which was in agree with the present study where 98% of the dental practitioners agree that knowledge of biomedical waste management is important and 92% of the dental practitioners felt that training for biomedical waste management should be made compulsory in their curriculum. This gives the insight that the current curriculum in dentistry doesn't emphasize enough biomedical waste management skills which ultimately carried in the private practice.

Aasim Farooq Shah et al[10] conducted a study among Dental Health Care Personnel (Dentists-and Auxiliaries) majority of the dentist had positive attitude only 10.78% had poor attitude towards BMW. This is in line with the results of the present study where 99.3% of the dental practitioners had positive attitude towards BMWM. The same positive attitude was observed by Deborah Gonmei et al[21] in Karnataka among Post Graduate students. Majority of them felt that safe management and segregation of healthcare waste management is important and all agree that they have limited knowledge regarding BMWM and require further training of the same. The present research the study participants felt that safe management of biomedical waste increases the financial burden (100%) on the hospital management which was similar to the research done by Asgad et al[14] among dentist in private clinics.

The essential components of hospital infection control programme are proper segregation, storage, transportation and safe disposal of BMW. If the process is not done in a prompt way it will be hazardous to not only health care personnel but also to communities and environment. It is the ethical responsibility of dental practitioners to ensure proper implementation of health care waste management policies in their clinics. Majority of the research[16,18,24] have concluded that the practice regarding the biomedical waste management was poor which was in agreement with the present research. In a study conducted by Rajeev Kumar et al[22] in Uttar Pradesh showed that only 6.38% of the post graduate students had poor practice which was in contrast

with the present research which showed 99.3% had poor practice. Only 22% of the dental practitioners were using needle destroyer to discard the used needles which was in line with the studies conducted by Raghuwar D. Singh et al[6] (21.9%) in Uttar Pradesh and Krishnaveni et al[31] (33.4%) in Andra Pradesh , this may happened due to the unawareness of the dentist regarding the needle destroyer. Among the private dental practitioners in Madurai 98% of the dentist do not segregate the biomedical waste according to different categories whereas in the research conducted by krishnaveni et al[31] 49.1% segregate the biomedical waste according to different categories hence this result was not in agreement with the present study.

According to the scoring criteria of the present study, the mean score for Knowledge was 4.2, Attitude was 6.03 and Practice was 2.11 whereas in a study done by sanjeev et al[15] the mean scores for Knowledge, Attitude and Practice was 4.35, 4.69, 4.43 respectively in which only the score of knowledge is similar to the present study therefore the dentist have their knowledge through their under graduate curriculum but they do not practice in their clinics.

The present study is first of its kind, providing education regarding biomedical waste management among private dental practitioners. Following health education and reinforcement consistent improvement in the mean score of knowledge (4.2, 5.03, 6.23), attitude (6.03, 6.82, 7.15) and practice (2.11, 2.24, 2.53) was observed respectively. The mean knowledge score increased as the awareness regarding BMWM among the study participants increased. All the participants agreed that the biomedical waste management rules are applicable for dentist at baseline, first and at second intervention. The most important part of managing biomedical waste is storage, which if done inappropriately can lead to health hazards. Unfortunately only 8% of the dentist knew about the maximum time limit for storage of the BMW at baseline which increased to 21% at the end of 1st intervention and 33% after the reinforcement. The biohazard symbol is used universally, to indicate the actual or potential presence of substance, material and rooms that can have dangerous impact on living being. In the current study, the

study participants were unable to differentiate between the symbol of the biohazard and recycling at baseline. At the end of the study approximately 50% of the participants could clearly identify the symbol of biohazard. All the participants accepted that they possess limited knowledge and need further training regarding BMWM. The increase in the mean attitude score illustrates a positive trend towards the BMWM among the study participants. At the end of the study all the participants agreed that health care waste management and segregation is important. Despite this perception they considered that BMWM increases the financial burden to the management. The number of dentist who were practising biomedical waste management in a scrupulous manner has increased significantly following the interventions provided. At the start of the study 99% of the participants did not have affiliation with the Bio medical waste management companies but at the end of the second intervention 7% of the participants have made a contractual agreement with BMWM companies. Needle stick injuries are very common among the health care providers and serves as a main source of infection transmission. A GCP guidelines suggest destroying the needle immediately after use, using needle destroyer but in the present research 22% of the practitioners were not using needle destroyer at the inception of the study, following the first (32%) and second (35%) interventions there was an increase in the usage of needle destroyer by the dental practitioners.

Although in the current study a strong effort was attempted to provide health education and reinforcement about biomedical waste management to dental practitioners of Madurai city. The results obtained was not satisfactory. The reason could be that change needs to be bought about as much as earlier stage before the habit forms. Since the study has conducted among dental practitioners it was difficult to change the execution of biomedical waste management to a greater extent, a very stringent curriculum which emphasis the need of biomedical waste management right from the 1st year of BDS.

CONCLUSION

It can be concluded that in the present study even though the dental practitioners have good level of awareness and knowledge regarding the biomedical waste management and also all the participants have positive attitude towards biomedical waste management but have limited execution of BMWM in their own clinics even after providing the health education. Thus, there is a urgent need for continuing dental education on dental waste management practices. It should be strictly implemented and monitored in a systemic manner by authoritative bodies in India. It is imperative that waste should be segregated and disposed of in a safe manner to protect the environment as well as human health because "Everyone wins, when the environmental health is respected and safe guarded."

RECOMMANDATION

Although the other approaches have made changes in the health care but regulatory approach had brought about the revolutionary change in health care like reducing incidence of the road traffic accidents after bringing the legislation of wearing the seat belt and helmets. In the developing countries like India the regulatory approach is the best method to bring about the changes for the better tomorrow. Government has taken many initiatives to treat the disease like Hepatitis B and HIV but this can be prevented to certain extent if biomedical waste management is done in a proper method. If the government establishes a BMWM plant at every district it will surely cut down on the cost and reduce the financial burden on the dentist.

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LIST OF ANNEXURES

SL.NO	CONTENT
1.	IRB (ETHICAL APPROVAL CERTIFICATE)
2.	PERMISSION LETTER FROM THE PRINCIPAL TO CONDUCT THE RESEARCH.
3.	LETTER FROM THE STATISTICIAN
4.	INFORMED CONSENT
5.	QUESTIONNAIRE TO ASSESS KNOWLEDGE, ATTITUDE AND PRACTICE REGARDING BIOMEDICAL WASTE MANAGEMENT.
6.	PAMPHLET REGARDING BIOMEDICAL WASTE MANAGEMENT.
7.	MADURAI MAP.

INSTITUTIONAL ETHICAL COMMITTEE

Best Dental Science College and Hospital

Ultra Nagar, Madurai - 625 104.

RECOGNIZED BY DENTAL COUNCIL OF INDIA, NEW DELHI
AFFLIATED TO THE TAMILNADU Dr. M.G.R MEDICAL UNIVERSITY, CHENNAI)

IRB/IEC Reference No: 2016-STU-BrVII-DPI-23

Project title: Effectiveness of health education programme on the knowledge, attitude and practices regarding biomedical wastes management among dental professionals in Madurai city

Principal Investigator: Dr. S. Dheepthasri, PG student

Review: New/Revised/Expedited

Date of Review: 27/09/2016

Date of previous review, if revised application:

Decision of the IEC/IRB:

- Provisional approval to conduct the study is being given
- The results of this study, along with summary are to be submitted for obtaining final approval

Recommended time period: one year (28-09-17)

PRINCIPAL
BEST DENTAL SCIENCE COLLE
MADURAI-625104

ETHICS COMMITTEE SIGN DATE BDSC

INSTITUTIONAL REVIEW BOARD SIGN. DATE BDSC

Signature of Member Secretary

NB:

- **Inform IRB/IEC immediately in case of any issue(s)/adverse events**
- **Inform IRB/IEC in case of any change of study procedure, site and investigator**
- **This permission is only for the period mentioned above**
- **Annual report to be submitted to IEC/IRB**
- **Members of IEC/IRB have right to monitor the trail with prior intimation**

From

Dr.S.Dheepthasri,
II year Post graduate student,
Department of Public Health Dentistry,
Best Dental Science College,
Madurai-625104.

Through

Dr.Umesh,
Head of the Department,
Department of Public Health Dentistry,
Best Dental Science College,
Madurai - 625104.

To

The Principal,
Best Dental Science College,
Madurai – 625104.

Respected Madam,

Sub: ***Request for Permission to conduct a research in partial fulfillment of the requirement of MDS curriculum.***

With reference to the above subject, I would like to bring to your kind notice that I, Dr. S.DHEEPTHASRI, second year post graduate in the department of Public Health Dentistry, have planned to conduct a research titled "**EFFECTIVENESS OF HEALTH EDUCATION PROGRAMME ON THE KNOWLEDGE, ATTITUDE AND PRACTICE REGARDING BIOMEDICAL WASTE MANAGEMENT AMONG DENTIST IN MADURAI CITY**" Therefore Madam, I kindly request you to grant me permission to conduct this research.

Thanking you,

Yours Sincerely,

(S.DHEEPTHASRI)

Date: 31.1.18

Forwarded to Principal madam for needful

31/1/18

PRINCIPAL
BEST DENTAL SCIENCE COLLEGE
MADURAI-625104

From

Mr.K.Asaithambi,M.Sc.,D.P.D.,D.J.M.C.,
(Retd)Lecturer in Statistics and Demography,
Research officer,
ICMR,Madurai Medical College,
Madurai.

To

The Head of the Department,
Dept of Public Health Dentistry,
Best Dental Science College,
Madurai.

Respected Sir,

Sub: Acceptance to help your student with statistical analysis reg.

With reference to the above subject, I hereby accept to help your student, Dr.S.Dheepthasri with the statistical analysis of her research work titled **"Effectiveness of Health education program on the knowledge, attitude and practices regarding biomedical waste among dental professionals in Madurai city"**

Thanking you,

Yours

26/3/17

[K. ASAITHAMBI]

BEST DENTAL SCIENCE COLLEGE AND HOSPITAL

MADURAI

DEPARTMENT OF PUBLIC HEALTH DENTISTRY

INFORMED CONSENT

RESEARCH TITLE: *"EFFECTIVENESS OF HEALTH EDUCATION PROGRAMME ON THE KNOWLEDGE, ATTITUDE AND PRACTICE REGARDING BIOMEDICAL WASTE MANAGEMENT AMONG DENTAL PRACTITIONERS IN MADURAI CITY"*

I, ……., exercising my free power of choice, hereby give my consent to be included as a participant in the study.

I agree to the following:

1. I have been informed to my satisfaction about the purpose of the study and procedures.

2. I understand that the study involves questions which may sometimes be personal.

3. I understand that I have rights to withdraw myself from the study and also that the investigator has the right to exclude me from the research at any point of time.

Investigator Signature of the Participant

Date

BEST DENTAL SCIENCE COLLEGE AND HOSPITAL
DEPARTMENT OF PUBLIC HEALTH DENTISTRY

RESEARCH TITLE: "EFFECTIVENESS OF HEALTH EDUCATION PROGRAM ON THE KNOWLEDGE, ATTITUDE AND PRACTICE REGARDING BIOMEDICAL WASTE MANAGEMENT AMONG DENTIST IN MADURAI CITY"

Age :	**Phone No :**	**Serial no:**
Gender :	**Qualification : BDS / MDS**	
DCI Reg No :	**Year of service :**	

PLEASE TICK THE APPROPRIATE ANSWERS FOR THE FOLLOWING QUESTIONS

1) Do you know about biomedical waste management?

a)Yes b) No

2) Do you think it is important to know about biomedical waste generation?

a)Yes b) No

3) Biomedical waste (management & handling) rules were first proposed in:

a) 1997 b) 1998 c) 1999 d) 2000

4) Amendments to the biomedical waste (management & handling) rules were made in:

a) 2000 b) 2001 c) 2003 d) 2004

5) Are you aware that biomedical waste management rules are applicable to dentists?

a)Yes b) No

6) Do you think all the waste generated in the hospitals are hazardous?

a)Yes b) No

7) According to national guidelines, what is the maximum time limit for which biomedical waste can be stored?

a) 24 hours
b) 72 hours
c) 48 hours
d) Don't know

8) Which of the following is the universally accepted symbol for biohazard?

a) 

b) 

c) 

d) 

9) Do you think safe management of health care waste is important?

a)Yes b) No

10) Do you agree that biomedical wastes should be segregated into different categories?

a)Yes b) No

11) Do you feel that biomedical waste management should compulsorily be made part of dental undergraduate curriculum?

a)Yes b) No

12) Do you think your knowledge regarding biomedical waste management is adequate?

a)Yes b) No

13) Do you think you require any further training on biomedical waste management?

a)Yes b) No

14) Do you think waste management is also doctor's responsibility?

a)Yes b) No

15) Safe management efforts by the hospital increase the financial burden on management.

a)Yes b) No

16) Do you think it is important to report to the Pollution Control Board of India about a particular institution if it is not complying with the guidelines for biomedical waste management?

a)Yes b) No

17) Does your clinic have a tie up with waste management companies?

a)Yes b) No

18) Do you have needle destroyer for discarding the used needles?

a)yes b) no

19) Do you segregate the biomedical waste according to different categories?

a)Yes b) No

20) Where do you dispose cotton, gauze and other items contaminated by blood?

a) Red plastic bag

b) Yellow plastic bag

c) General garbage

d) Blue plastic bag

e) White plastic bag

21) Where do you dispose pharmaceutical waste?

a) Red plastic bag

b) Yellow plastic bag

c) General garbage

d) Blue plastic bag

e) White plastic bag

22) Where do you dispose used syringe ?

a) Red plastic bag

b) Yellow plastic bag

c) General garbage

d) Blue plastic bag

e) White plastic bag

23) Where do you dispose metal sharps?

a) Red plastic bag with Puncture poof container

b) Yellow plastic bag with Puncture poof container

c) General garbage with Puncture poof container

d) Blue plastic bag with Puncture poof container

e) White plastic bag with Puncture poof container

24) How do you discard the broken glasswares?

a) Red plastic bag

b) Yellow plastic bag

c) General garbage

d) Blue plastic bag

e) White plastic bag

25) Where do you dispose the used fixer and developer solution?

a) Red plastic bag

b) Yellow plastic bag

c) General garbage

d) Blue plastic bag

e) White plastic bag

26) Where do you dispose the orthodontic brackets and wires?

a) Red plastic bag

b) Yellow plastic bag

c) General garbage

d) Blue plastic bag

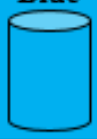
e) White plastic bag

27) Are you using personal protective measures while handling biomedical waste management?

a)Yes b) No

PAMPHLET

BIOMEDICAL WASTE MANAGEMENT – COLOUR CODING SEGREGATORY PATTERN

Category	Type of waste / container used	Type of waste	Dental waste
Yellow 	Non – chlorinated plastic bags. Separate collection system leading to effluent treatment system	• Human anatomical waste • Animal anatomical waste • Soiled waste • Expired or discarded medicines • Chemical solid/liquid waste • Clinical lab waste	Extracted tooth, tissues taken for biopsy. Blood contaminated cotton, swabs, linen, gowns and drapes. Expired medicines, Formalin, developer and fixer solution, hydrogen peroxide, Amalgam, Impression materials.
Red 	Non – chlorinated plastic bags or container	Contaminated waste(recyclable) Tubing, bottles, intravenous tubes and sets, catheters, urine bags, syringes(without needles) and gloves.	All infectious non sharp plastic wastes, agate spatula, plastic impression trays, plastic bowl, suction tip, x-ray film, bite blocks, cheek retractor, plastic wedges.
White 	Translucent Puncture, leak, tamper proof container	Waste sharps including metals	Endodontic files, Needles, Scalpels, Orthodontic wires, brackets, matrix band, Chipped metal crowns, rusted or broken sharp metal instruments.
Blue 	Cardboard boxes with blue coloured marking	Glassware	Slides, Broken dappen dish, mouth mirror, magnifying glass, glass slab, bottles, Test tubes.

Dr. S.Dheepthasri,III year MDS (Public Health Dentistry),Best Dental Science College.

MADURAI CITY MAP